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*NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.*

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## Home-Produced Power-Alcohol

THE study of the problem of producing power-alcohol from home-grown tuber or root crops is advanced a further stage by Sir Frederic Nathan's memorandum just published by the Department of Scientific and Industrial Research (H.M. Stationery Office, pp. 37, 9d.). This deals in detail with the possibilities of using potatoes, mangolds, or Jerusalem artichokes as raw material for the production of power-alcohol in this country. The considerable experiments that have been carried out are reviewed in detail, and the records and opinions expressed on them are worth study, but for the moment the main concern are the conclusions reached. These, though not final, make a definite approach towards a definite policy.

Grain-growing in Great Britain for the special purpose of power-alcohol production is dismissed at once as "unthinkable." If vegetable materials other than waste ones are to be utilised, they must be obtained from some root or tuber crop, and at once the most suitable are held to be potatoes, mangolds, or Jerusalem artichokes, the merits of each of which are examined. In the case of potatoes it is thought very unlikely that they could be grown at a price which would enable alcohol to be produced as an alternative to petrol at anything approaching its present price. Since one ton of potatoes produces 20 gallons of 95 per cent. alcohol, every £1 it costs to grow a ton of potatoes is equivalent to 1s. on a gallon of alcohol for raw material. The possible method has been suggested of co-operation between the potato grower and the distiller, the erection of small distilleries in the centres of growing districts, the combination of cattle rearing with potato cultivation so as to utilise the distillery residues for cattle feeding, and the use of the resulting manure on the land.

The mangold is held to possess several advantages over the potato in that it is an easier crop to grow, harvest and store; it is not so liable to disease and failure, and its carbohydrates being in the form of sugar, the process of manufacture of alcohol from it is simpler. The yield of 95 per cent. alcohol per ton calculated on the average sugar content is about 8 gallons, so that every £1 it costs to grow a ton of mangolds is equivalent to about 2s. 8d. on a gallon of alcohol for raw material. The average yield of mangolds per acre in Great Britain is, however, 19 tons as against 5·7 tons of potatoes, and the price is about £1 10s. for the former as against about £7 for the latter on the wholesale market. If potatoes are used, the cost per gallon for the raw material would be 7s.; if mangolds, the cost would be 3s. 9d.

The Jerusalem artichoke, the cultivation of which is easy, has been recognised as a possible raw material for many years past, and yields varying from 15 to 25 gallons of 95 per cent. alcohol per ton of tubers have been given. Experiments conducted by the Department of Explosives Supply in 1918 gave a yield of 17½ gallons per ton. These were continued at the Royal Naval Cordite Factory in 1919, and semi-technical scale working gave a yield of about 18·7 gallons of 95 per cent. alcohol per ton of tubers. Experiments were also carried out at the factory on the production of butyl alcohol and acetone by means of an organism belonging to the *Bacillus butylicus* group. The results indicated that a yield of 12 gallons of the mixed solvents was obtainable. By the simultaneous fermentation of the tubers by yeast and the action of the organism, a liquor was obtained consisting of 70 per cent. of ethyl alcohol, 10 per cent. of acetone, and 20 per cent. of butyl alcohol. The actual and calculated yields per acre of the sun-dried artichoke stalks were determined in the case of the 1921–22 cultivation experiments and ranged from 2·09 to 5·4 tons, with an average of 3·5 tons per acre. Experiments have shown that by means of suitable treatment a pure resistant cellulose can be prepared from these stalks, the yield of which, calculated on the sun-dry ripe stalks, is approximately one-third ton to the acre. This cellulose, it is considered, would be very suitable for certain purposes.

## The Toxic Effects of Fertilisers

WITH the growth in the use and variety of fertilisers, more particularly the newer compounds that have made their appearance alongside the development of atmospheric nitrogen fixation processes, it has become essential to give the most careful scrutiny to all the factors that go towards establishing the relative suitability of specific substances when faced with the many different sets of conditions which may arise from the consumer's standpoint. With nitrogenous materials it is not only necessary to consider nitrogen content, but of almost equivalent importance are such factors as the readiness with which the material will undergo physical and chemical change in the soil, its physiological reaction, and the possible presence in it of substances inimical to plant growth. In nearly all countries synthetic fertilisers, in some cases in fairly substantial assortments, are being offered for agricultural use. It has been intimated that before long Billingham may be introducing some variety into its programme, and there would seem to be no obstacle in the way of the Brunner-Mond undertaking eventually producing on the lines of the Badische concern, whose products now include ammonium sulphate-nitrate, potassium-ammonium nitrate, ammonium sulphate, ammonium chloride, sodium nitrate, and urea. Again, it is interesting to hear that in the United States ammonium phosphate, sodium nitrite, hydrocyanic acid, and ammonium chloride are now being made directly or indirectly from atmospheric nitrogen.

If the producer is to be completely freed from suspicion so far as the utilisation of synthetic materials of the newer order is concerned it will become increasingly necessary for experimental work to be followed up and precise information made available which will assure the grower that the quality of his crops will not suffer from the use of any particular fertiliser. In connection with the toxic effects which are known to take place under certain conditions a great deal of valuable work has been carried out in this country, and we have already referred in these columns to the helpful views expressed by Sir E. J. Russell. The results of parallel work carried out in another part of the globe are, however, always valuable for purposes of comparison, and probably many of our readers will be interested in the opinions expressed on the question of toxicity by workers at the well known agricultural station at New Jersey. We are told, for instance, that large applications of chlorides are known to depress the yield of certain crops, so that ammonium chloride, one of the most promising of synthetic fertilisers, has its limitations. Attention is also drawn to the fact of the possible occurrence of pyridene or other toxic substances in ammonium sulphate resulting from the carbonisation industries, and of perchlorates and borates in Chilean nitrates. In justice to the manufacturers of these products it must, however, be mentioned that every effort is made to eliminate these undesirable substances, so that the likelihood of harm is extremely remote.

Calcium cyanamide has, of course, always been the object of a certain amount of criticism, for the presence of dicyanodiamide ($C_2H_4N_4$) is believed to account for the unsatisfactory results which have been recorded in the use of this fertiliser. The problem presents itself again in connection, not with chemically pure urea, but with the so-called crude urea, which is produced from cyanamide by treating the latter with sulphuric acid. Guanyl urea sulphate $(C_2H_6N_4O_2),H_2SO_4,2H_2O$, is found in commercial urea made as stated above, and it would seem evident from recent American experiments that while this crude urea was responsible for some depression of growth, urea nitrate and chemically pure urea gave results at least as good as those obtained with sodium nitrate and ammonium sulphate.

## The Disposal of Effluent Liquors

QUESTIONS are often asked concerning the treatment and disposal of effluent liquors from sulphate of ammonia plants. The disposal of such waste liquor is becoming increasingly difficult, and many English chemical manufacturers and gasworks are confronted with a real problem, with which continental firms, similarly situated, are concerned very little, if at all. In Germany, no such difficulty exists. Chemical manufacturers there, whose works are situated on the Rhine, take advantage of this fast-flowing river and discharge all kinds of effluent liquor into it with impunity. The liquors are carried out to sea, and apparently no inconvenience or trouble is occasioned. Yet in this country we find the management of a gasworks, which is contemplating the erection of a small sulphate of ammonia plant, in fear and trembling lest they incur the displeasure of the local authority, which has no bacterial system, but purifies its sewage to some extent by allowing it to traverse a channel containing an alum block before discharging into tidal waters.

We fear that there is, at times, some considerable misunderstanding concerning the disposal of spent effluent liquor, in so far as it affects the local authority concerned. Two important Acts have reference to this matter; one is the Pollution of Rivers Act, of 1876, by which County Councils have power to restrain a person or firm from polluting a stream, but if that person or firm can show to the satisfaction of the court that the best practicable and reasonably available means have been taken to render harmless the liquid flowing into the stream, then no offence shall be deemed to have been committed.

The admission of effluent liquor to sewers is covered by provisions contained in the Public Health Acts, Amendment Act, 1890, Part 3, Clause 17, Sections 1 to 3. In connection with the latter Act, there are three considerations of importance: (*a*) the volume of spent liquor discharged to the sewer in relation to the volume of the sewage; (*b*) the nature of the sewage, and (*c*) the temperature at which it is discharged, which must not exceed 110° Fahr. Where the volume of spent liquor does not exceed 0·5 per cent. of the total sewage, exception is rarely taken to its discharge. The whole subject, however, is very fully discussed in the book which Mr. P. Parrish has recently written on *The Design and Working of Ammonia Stills.*

Concerning the case under review, provided the undertaking ensures that the lime sludge is removed prior to the discharge of the effluent liquor to the sewer, and that the temperature of the liquor does not exceed 110° Fahr., we can hardly imagine that the local authority would object to receiving the waste liquor. The function of the alum block is primarily that of a coagulating agent, but chemically it will precipitate certain soluble matter present in the sewage. Effluent liquor, however, representing 2 to 3 per cent. of the total volume of sewage, will not affect in any marked degree the user of the alum, and the matter appears to be one for accommodation between the gas undertaking and the local authority, and no difficulty in the disposal of the liquor should arise in the peculiar circumstances in question. All such cases need to be considered on their merits, and what applies to one local authority is not necessarily applicable to another.

## Finding the Overseas Customer

AN interesting letter published in this issue, from the Agricultural Chemist to the Department of Agriculture, Straits Settlements and Federated Malay States, indicates the unexplored markets which yet exist for the export of British chemical products, and the way in which the regular trade and technical journal penetrates into these remoter quarters and brings the local needs to the notice of home producers. In January of this year Mr. Rex Furness described in THE CHEMICAL AGE "Some new uses of silicate of soda." In reply to this our correspondent, writing from Kuala Lumpur, states that he is particularly interested in the use of sodium silicate as an adhesive, as a lining for barrels, boxes, and latex coagulating tanks, and as a means of treating concrete floors and roads, and he adds that there may be a considerable use in these directions in the Malay States, where rubber growing and treatment are an important industry. The firms concerned in the production of silicate of soda in this country will no doubt be interested in this communication and take effective steps to explore the possibilities of its application to the industries of Malay. For some time THE CHEMICAL AGE has been acting as an unofficial clearing house for many inquiries of this nature, and there is real satisfaction in being able to establish new points of connection between home producers and distant consumers.

## Safeguarding Duty on Superphosphate

WE learn officially that the Board of Trade have appointed a Committee consisting of Sir Arthur Whinney, K.B.E. (Chairman), Mr. Arthur Hollins and Sir R. Henry Rew, K.C.B., to inquire into and report upon an application made by the Fertiliser Manufacturers' Association, Ltd., in accordance with the terms of the White Paper relating to Procedure and Inquiries in connection with the Safeguarding of Industries, presented to Parliament on February 3, 1925, for the imposition of a duty upon superphosphate. The Secretary to the Committee is Mr. W. H. L. Patterson, Board of Trade, Great George Street, London, S.W.1, to whom all communications relating to the work of the Committee should be addressed.

## Points from Our News Pages

The problem of low temperature carbonisation is reviewed by Mr. N. Simpkin, Director of Research to the Lancashire and Yorkshire Coal Research Association in an address at Hull (p. 268).

The Chemical Trade returns for February show imports up and exports down on last year's figures; but exports are up on January totals (p. 270).

A summary of the discussion on Professor Mellanby's paper on "Expansion and Compression Phenomena in Steam Jets" (p. 271).

A paper entitled "A Review of Calcium Carbide" was given by Mr. C. Coulson-Smith, M.Sc., before the British Acetylene and Welding Association (p. 272).

Correspondence is published on "Openings for Silicate of Soda" (J. Eaton) (p. 274); "Moth-Proof Fabrics" (Kenford, Ltd.) (p. 273).

Professor E. C. C. Baly's interesting impressions of America include a survey of the American University system and its advantages (p. 276).

The death is recorded of Mr. A. C. Hopps, of Mr. R. A. Oddy, F.C.S., and of Mr. W. Derry, B.A. (p. 281).

Our London Chemical market report shows that last week's increased activity has been maintained, and business, while still in the main for small quantities, is keenly competed for (p. 282).

Our Scottish market report records a slight improvement in the heavy chemical market, but the volume of business is unsatisfactory (p. 285).

### Books Received

NEW REDUCTION METHODS IN VOLUMETRIC ANALYSIS. By E. Knecht and E. Hibbert. London: Longmans, Green and Co. Pp. 134. 8s. 6d.

CHEMICAL ENGINEERING AND CHEMICAL CATALOGUE, 1925. Edited by D. M. Newitt. London: Leonard Hill. Pp. 260.

THE MANUFACTURE OF ACIDS AND ALKALIS.—Vol. IV. THE MANUFACTURE OF SULPHURIC ACID (CONTACT PROCESS). By Frank Douglas Miles. London: Gurney and Jackson. Pp. 428. 30s.

FUEL FOR MOTOR TRANSPORT.—Third Memorandum. By the Fuel Research Board of the Department of Scientific and Industrial Research. London: H.M. Stationery Office. Pp. 37. 9d.

## The Calendar

| 1925 Mar. | | |
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| 23 | Institute of Chemistry (Leeds Section): "Alchemists and Chemists in Art and Literature." R. B. Pilcher. 7 p.m. | The University, Leeds |
| 25 | British Chemical and Dyestuff Traders' Association, Ltd.: Annual General Meeting. 2.30 p.m. | Cannon Street Hotel, London. |
| 25 | Society of Chemical Industry (Newcastle Section): "The Sampling of Coal." F. H. Walker. 7.30 p.m. | Armstrong College, Newcastle-on-Tyne. |
| 26 | Chemical Society: Annual General Meeting. 4 p.m. | Burlington House, Piccadilly, London. |
| 26 | Institute of Chemistry. (Belfast and District Section): Discussion—"The Union of Chemical Societies," opened by Dr. W. H. Gibson. | Queen's University, Belfast. |
| 27 | Royal Institution of Great Britain: "Studies of Atomic Nuclei." Sir Ernest Rutherford. 9 p.m. | 21, Albemarle Street, London, W.1. |
| 27 | Newcastle Chemical Industry Club, Society of Chemical Industry and Institute of Chemistry (Newcastle Sections): Annual Dinner. 7.30 p.m. | Tilley's, Blackett Street, Newcastle. |
| 31 | East London College: Conversazione. 7 p.m. | Mile End Road, London, E.1. |
| 31 | Society of Chemical Industry (Birmingham and Midland Section): Annual General Meeting "The Inorganic Constituents of Coal." Dr. R. Lessing. | University Buildings, Edmund Street, Birmingham. |

# Some Aspects of Low Temperature Carbonisation

By N. Simpkin, M.Sc.(Tech.), A.I.C.

*At a meeting of the Hull Chemical and Engineering Society on Monday the problem of Low Temperature Carbonisation was reviewed by Mr. N. Simpkin, Director of Research to the Lancashire and Yorkshire Coal Research Association. We give the address as a concise statement respecting early pioneer work in this field, the existing processes, and the choice of plant.*

THIS lecture has for its main object, not a discourse either upon the solution of the smoke problem or a detailed description of low temperature carbonisation plants, but rather has three aims :—

(1) A brief reference to the difficulties which beset early pioneers in this work.

(2) A classification of the processes for carbonising coal at low temperatures.

(3) The choice of plant in view of the products required.

### Difficulties of Low Temperature Carbonisation

The main difficulty probably lies in the fact that engineers, chemists, and others when designing retorts failed to understand and appreciate the properties of coal. From the point of view of preparing a low temperature coke, the properties of the raw material of chief concern are as follows :—

(1) The behaviour of the coal when heated slowly or rapidly to 600° C.

(2) The conductivity of the coal for heat.

Coals differ so considerably from one another that it might almost be said that no two are alike. Hence the behaviour of a coal upon carbonisation is influenced by its nature and also by the method and rate of heating. It is not possible to describe here the effect of heat on different coals, but if three cases are briefly described, viz., a non-caking coal, a medium caking coal, and a strongly caking coal, it will serve to indicate some of the difficulties of designing a suitable retort for carbonising coal at low temperatures. On heating the non-caking coal, decomposition occurs as the temperature rises, the coal itself does not fuse or soften to any degree, it does not expand, whilst the coke is either very weak or almost a powder. In the case of medium caking coal, decomposition is accompanied by softening and frequently by expansion of the coal, whilst the coke is slightly swollen and fairly strong. Lastly, a strongly caking coal such as was formerly recognised as ideal for the manufacture of metallurgical coke will, when carbonised at low temperatures, yield a highly swollen, very porous, soft coke. It is clear that if each of these coals was carbonised in a closed retort, difficulties would be encountered from the caking coals owing to the expansion and consequent sticking or holding up of the charge. A further point must also be mentioned, viz., that the semi-fused coke offers great resistance to the passage of the gas, with the result that cracking of the tar occurs, whilst the evolution of the gas tends to produce a porous coke. Hence a retort must be of such construction that the gases and vapours evolved can escape as readily as possible and without undue overheating.

The difficulty of the low conductivity of the coal was encountered in the very early history of the industry. In 1880 Scott Moncrieff suggested that low temperature coke should be prepared in gas retorts, but instead of obtaining a semi-coke, the carbonised residue consisted of an outside layer of coke, an inner layer of semi-fused sticky material and a core of coal which had barely altered. Similar conditions pertain in a modern coke oven where with a flue temperature of 1,200° C. or over it is several hours before the centre of the charge reaches red heat. Hence the tendency is towards a much narrower oven. In the preparation of low temperature coke where the flue temperature lies at about 600° C., the transference of heat is much slower and the necessity for a narrow oven becomes far more imperative. Hence it has become an axiom that the coal must either be heated in thin layers or other means adopted for conveying heat through the coal, and the various methods of attaining this object are classified below.

### Classification of Retorts

As a result, chiefly in the first case of the "hit or miss" principle, a large number of differently designed retorts have been suggested and tried for carrying out the process; some, in the light of present knowledge, doomed to failure almost from the beginning, others developing into methods which now bid fair towards large scale success.

It is not intended to describe the different plant which has been tried or which is now in operation or undergoing construction for carbonising coal at low temperatures, but a classification of these processes and a brief reference to a few typical retorts will indicate the variety of plant which is being employed for low temperature carbonisation.

Retorts may be divided into four main classes according to whether the heating is performed by external or internal application and whether the process is continuous or intermittent. Thus :—

(1) *Externally Heated Retort with Intermittent Feed.*

This method of performing the process is the one which would suggest itself upon first examination of the problem. It is comparable with the method of manufacture of metallurgical coke in closed ovens, heated externally, and of ordinary town's gas where the same principles underlie the method of carbonisation. Parker's original process belonged to this class of retort. W. D. Scott Moncrieff, writing in *Nature* in 1880, had this method of carbonisation in mind when he suggested that gas works, instead of obtaining 10,000 cu. ft. of gas per ton of coal carbonised, should carry the distillation so far as to yield only a third this amount, pass three times the amount of coal through the retorts, and obtain a richer gas and a coke which would be suitable for domestic purposes.

The present Coalite retort belongs to this class, but it has undergone considerable changes in view of the experience and knowledge gathered in the last few years. The latest retort consists of an iron casting containing twelve vertical tubes each 9 ft. long, $4\frac{1}{2}$ in. in diameter at the top and tapering to a diameter of $5\frac{1}{2}$ in. at the bottom to facilitate removal of the coke. The retorts are externally heated by means of the gas produced from the process and owing to this arrangement no part of the coal undergoing carbonisation is far removed from the source of heat.

(2) *Externally Heated Retort with Continuous Feed.*

This type of retort might be said to follow on from the previous one. Having produced a retort which would carbonise coal at a low temperature, the next step was to make the retort continuous in its action. This, however, was not so easy as would appear at first, the large number of retorts of this class bearing witness to this point and indicating the numerous methods by which it was hoped to overcome the difficulties arising. One of the main difficulties attending the operation of a continuous process is the fact that, with many types of coal, the fuel will not "flow" through the retort. If the material to be carbonised is of the nature of a shale or a non-caking coal, the problem is not so difficult, but the resulting product, on the other hand, is useless as a domestic fuel as it comes direct from the retort. A coal which is strongly caking and swells on carbonisation sticks in the retort and renders ordinary retorting processes useless.

To overcome these difficulties many different retorts have been constructed and have, to a large extent, solved the problem. These may be outlined briefly as follows :—

(*a*) Retorts constructed upon the principle of a tunnel kiln, the coal passing through a heated zone in suitable containers.

(*b*) Retorts in which the coal is caused to move by means of its own weight, the retort being vertical and fed from the top, the carbonised product being withdrawn at the bottom.

(*c*) Retorts in which agitation of the coal is produced by the rotation of the retort itself, on the principle of a cement kiln, the retort, however, being heated from the outside. The coal passes through the retort owing to the inclination of the retort, the material to be carbonised being fed in at the higher end. The "Fusion" retort operates upon this principle.

(*d*) Retorts in which the coal is forced through the retort mechanically, by means of rotating arms or other suitable arrangements. As an example of this the primary retort of the Carbocoal Process may be taken as an example.

(3) *Externally and Internally Heated Retorts with a Continuous Feed.*

These are based upon the principles underlying the retorts used for treatment of brown coals and oil shales.

(4) *Internally Heated with Continuous Feed.*

This method differs essentially from those above in that the heat required to carbonise the charge is derived by bringing the latter into contact with a hot gas or liquid which carbonises the coal by its own sensible heat. Retorts of this type may be subdivided into three classes :—

(*a*) Where heating is performed by means of superheated steam which passes through the charge. Parker's original process embodied this idea, his patent of 1890 (this was not his master patent, which was only taken out in 1906) claiming the production of a smokeless fuel by passing steam, water gas or coal gas superheated to a temperature of 600° to 650° C. through a mass of coal in a retort. Other processes, e.g., the Pure Coal Briquette Process, a plant for which is in course of erection at Leigh, Lancashire, are performed by this means. In this process the coal is first pulverised and then briquetted without binder. By careful selection or blending of the coal, briquettes can readily be obtained which retain their shape, are quite hard, do not adhere together in this retort, and burn readily.

(*b*) Where the heat is supplied by hot producer gas or combustion products, as an example the Nielsen retort ought to be mentioned. The retort itself is a large horizontal cylinder, capable of rotation and slightly inclined to cause the coal to pass through the retort. The lower end is connected to a producer, the hot gases from which pass through the retort and so carbonise the charge.

In the Maclaurin plant in course of erection at the Dalmarnock Gas Works of the Glasgow Corporation, the heat is generated in the coal itself. The retort consists of a producer not unlike a blast furnace in shape but built square. Steam is blown in at the bottom. This cools the coke, and as the steam passes upwards through the charge it reaches the combustion zone, where air is drawn in through port holes. Producer gas is generated and this supplies the heat necessary for carbonisation. In the coal above the combustion zone, distillation is in progress, and the temperature falls gradually towards the top where arrangements are made for collecting the tar evolved.

A number of by-product recovery producers and generators yielding a mixture of coal gas and water gas are constructed broadly on these lines, but there is no attempt at the recovery of a low temperature coke.

(*c*) Where heating is performed by a hot liquid. The outstanding example of this is the Piron-Caracristi process operated by the Ford Co. The retort consists of a double chamber furnace lined with refractory material and provided with a bath of molten lead maintained at the desired temperature for carbonisation. A floating conveyor carries the coal over the hot lead, where carbonisation occurs, and then discharges the product on to a second conveyor which removes the coke for storage.

### Selection of Plant

It will be seen from the above that there has been considerable enterprise and experiment in developing a process or processes to carbonise coal satisfactorily at low temperatures, and the question may well be asked as to which is the most satisfactory method. This cannot be answered without due consideration of a number of factors, among which the following are perhaps the most prominent :—

(1) The nature of the material to be carbonised.

(2) The object in view, *i.e.*, whether a low temperature coke, the tar or the gas or all three are products desired.

(3) The efficiency and ease of working and control of the retort itself.

(4) The cost, which is wrapped up and connected with each of the above.

1. *Nature of the Material to be Carbonised.*

Attempts have been made to carbonise at low temperatures a variety of carbonaceous substances ranging from lignites, brown coals, bituminous coals of various types, to shales and waste products such as colliery refuse.

Considering the wide differences in nature and behaviour of these materials on heating, many designers of plant were well justified in constructing a retort with the object of dealing with only one class of material whilst other retorts have been constructed to handle materials varying considerably in nature, and are consequently more " elastic " in operating upon different types of coal, etc.

As lignites and brown coals do not come within the range of raw material which can be obtained in England, it is proposed to deal chiefly with bituminous coals, shales, etc. Bituminous coals vary in nature, some being strongly caking and ideal for coke manufacture. These as a rule are low in volatile matter, expand on carbonisation and yield a strong coke at high temperatures. Others yield a high percentage of volatile matter, shrink on carbonisation, and yield a very weak coke. Between these two limits there are various types, some yielding slightly swollen cokes of medium strength. It must be remembered, however, that coals frequently behave very differently when carbonised at low temperatures, say, 600° C., to what they do at high temperatures, and a coal which yields a firm strong coke under the latter conditions may, when carbonised at low temperatures, give a coke totally unsuitable for many purposes owing to its great porosity and friability.

Obviously a coal which expands considerably upon carbonisation at low temperatures cannot be handled satisfactorily in a retort where no allowance is made for this property of the coal, and as such coals almost invariably give rise to a well-fused porous coke, great difficulty would be experienced in removing the latter from the retort. A coal of this type would of necessity have to be carbonised in a retort where due allowance was made for expansion, *e.g.*, a rotary retort, or in the alternative, the properties of the coal would require modification by blending with a non-swelling coal of low caking quality.

Shales vary widely in nature and behaviour on carbonisation, but the great swelling properties characteristic of many coals are absent. It has often been proposed to subject colliery refuse to some form of low temperature carbonisation, and thus utilise a material which is at present unsaleable and to all intents and purposes useless.

Colliery refuse consists of washery dirt, carbonaceous shale, fines, etc., which owing to their nature are usually very low in caking qualities, possess a high moisture and ash content, and can only be considered as of very doubtful material as far as low temperature carbonisation is concerned. The carbonised residue would in most cases be useless for direct consumption as a fuel unless its ash content permitted of its use as pulverised fuel whilst the tar yield would tend to be low. The coke might in certain circumstances be employed for the generation of producer gas, but it must be recognised that in most cases the ash content is very high.

2. *The Object in View.*

This may be subdivided into several classes, the most prominent but perhaps not the most important being the production of a smokeless, low temperature coke. If this is to be used direct for domestic consumption, the coke must be sufficiently hard and strong to stand handling, whilst at the same time it must be of low ash content. Hence careful selection and, if necessary, blending of the coal must be made. If the coke is briquetted subsequent to carbonisation a coal may be used which does not possess the required coking qualities, but if briquetting with a pitch binder is resorted to the product will require further carbonisation to render it smokeless.

In the Smith or Carbocoal Process in operation in America, the low temperature carbonisation is performed in a horizontal retort fitted internally with rotating shafts carrying arms which agitate the coal and force it through the retort. The semi-powdered coke is then briquetted with a pitch binder and recarbonised at a higher temperature.

Reference has already been made to the Pure Coal Briquette Process, where the powdered coal is first briquetted without binder and subsequently carbonised, the coal being selected so that undue expansion and consequent disintegration or fusing together of the briquettes in the retort does not occur.

It will be seen that the retort must be chosen which will yield a coke in a form suitable for the purpose required.

If it is not intended that the coke be used for domestic consumption considerably more latitude is permissible both in the coal employed and the type of retort. In the first place much poorer qualities of coal, from the point of view of ash content and caking qualities, can be utilised whilst the coked

residue can be employed either for industrial purposes, for firing on chain grate and other mechanical stokers, or may be pulverised and utilised in the form of powdered fuel for firing boilers, furnaces, cement kilns, etc. This latter mode of treatment has certain advantages; the coke, provided a suitable coal is used, requires very little grinding; previous drying, which has to be resorted to in the case of many coals, is unnecessary; the material can be stored if desired without fear of spontaneous combustion, and whilst ensuring smokeless combustion, the by-products are obtained by the previous low temperature treatment.

Certain processes operate with the primary object of obtaining not a smokeless fuel but the tar and ammonia followed by the complete gasification of the carbonised residue. In such instances, the retort is usually of the type belonging to class 4 above, *i.e.*, internally heated and a continuous feed. If producer gas is employed as the heating medium no attempt is made to separate this from the rich gas evolved whilst the carbonised residue is subsequently gasified. In a combined plant of this type, the ultimate yield of ammonia (or ammonium sulphate) is very high compared with the other processes, particularly if excess steam is used in the producer. It must be clearly understood that by ordinary low temperature carbonisation, yields of sulphate above, say, 12 to 14 lb. cannot be obtained unless temperatures above 600° C. are employed. Certain processes, *e.g.*, the Maclaurin retort, will yield higher figures, but here the temperature in part of the retort exceeds the figure stated. Furthermore, the recovery of small amounts of ammonia may not repay the cost of the operations involved. Difficulties may also be encountered in disposing of a weak ammoniacal liquor which cannot be economically worked up for sulphate.

(3) *The Efficiency and Ease of Working and Control of the Retort Itself.*

It is scarcely necessary to state that the economy of the retort should be as high as possible. With this in view, the essentials of a satisfactory process may be summarised briefly. The retort or battery should be capable of dealing with large quantities of coal, and the process should either be continuous or the charging and discharging of the retort should be capable of being performed in a comparatively few minutes so as to avoid loss of heat and irregularity. The throughput should be as high as possible compared with the size of the plant, and temperature should be capable of easy control so that uniformity is obtained in the product. Reference has already been made to the removal of tar vapours from the hot zone, and tar vapour evolved at any temperature should not be subjected to higher temperatures. The consumption of gas for heating the retorts must be as low as possible. Since coal is a very poor conductor of heat, the coal should theoretically be carbonised in thin layers. The failure of many of the earlier retorts was due solely to the fact that insufficient attention was paid to this point alone.

(4) *The Cost.*

The cost of the process is influenced not only by the actual initial cost of the plant and its running costs, but upon a number of external contributory factors. Among these may be mentioned the facilities for obtaining a suitable coal at a satisfactory price, and the means for disposal of the products. The coke, if intended for household consumption, must satisfy requirements as to hardness, low ash content and price. The income from sale of sulphate may, as mentioned above, be very problematical in certain cases, owing to cost of working up the liquor obtained. If the retort is such that it yields a small quantity (approximately 3,000 cu. ft. of a rich gas) this may be sold for enriching town's gas, if local conditions permit or it may be employed for heating the retorts. When the former case is adopted, other gas, *e.g.*, producer gas, is required for heating the retorts. Processes which give a very high yield of enriched producer gas will again be dependent upon local conditions for disposal or utilisation for furnaces, etc.

## Chemical Enterprise in Palestine

Sir Alfred Mond, giving impressions of his recent Palestine tour, referred to the "large industrial capitalistic enterprises," such as the salt works at Athlit, the oil and soap works, and the Neshes cement works at Haifa. He also mentioned the mineral resources of the Dead Sea, particularly the phosphate and other deposits.

# Chemical Trade Returns for February

### Imports Up, Exports Down, on Last Year's Figures

The imports for February of chemicals, drugs, dyes, and colours show an increase of £57,097 over the figures for February, 1924, the figures being £1,278,680 and £1,221,583. Compared with January, 1925, the figures show a decrease of £3,991. Exports, however, are down on last year's figures by £194,603, the figures being £2,157,712 and £2,352,315. They are up by £37,769 on the previous month.

In the imports notable features are the figures recorded for coal tar and alizarine dyestuffs, potassium nitrate, and barytes; in the exports considerable increases are to be seen in tar and creosote oil, crude glycerin, and anthracene. Marked decreases will be observed in the case of benzol and toluol, and naphtha.

### Imports for February

Increases.

| | | 1925. | 1924. |
|---|---|---|---|
| Acid, acetic | tons | 692 | 424 |
| ,, tartaric | cwts. | 3,699 | 2,364 |
| Bleaching materials | ,, | 12,871 | 9,957 |
| Calcium carbide | ,, | 78,207 | 67,982 |
| Sodium compounds (except nitrate) | ,, | 22,916 | 16,125 |
| Sodium nitrate | ,, | 157,995 | 130,940 |
| Zinc oxide | tons | 860 | 619 |
| White lead (dry) | cwts. | 10,835 | 8,190 |
| Unspecified painters' colours | ,, | 66,880 | 54,190 |
| Barytes (including blanc fixe) | ,, | 64,053 | 36,978 |
| Essential oils (other than turpentine) | lbs. | 368,036 | 325,259 |
| Potassium nitrate | cwts. | 15,298 | 2,966 |
| ,, compounds (except nitrate) | ,, | 523,429 | 439,901 |
| Alizarine dyestuffs | ,, | 3,721 | 435 |
| Indigo, synthetic | ,, | — | — |
| Unspecified coal tar dyestuffs | ,, | 5,654 | 2,123 |
| Nickel oxide | ,, | 4,184 | — |

Decreases.

| | | 1925. | 1924. |
|---|---|---|---|
| Cream of tartar | cwts. | 2,720 | 3,929 |
| Turpentine | ,, | 19,953 | 32,978 |
| Mercury | lbs. | 64,697 | 101,625 |
| Intermediate coal tar dyes (including aniline oil and salt, and phenyl glycine) | cwts. | 5 | 155 |
| Indigo, natural | ,, | 33 | 114 |
| Glycerin, crude | ,, | — | 3,725 |
| ,, distilled | ,, | 67 | 179 |

### Exports for February

Increases.

| | | 1925. | 1924. |
|---|---|---|---|
| Bleaching powder | cwts. | 29,863 | 26,718 |
| Carbolic acid | ,, | 11,843 | 9,750 |
| Tar oil, creosote oil, etc. | gal. | 4,097,259 | 1,640,009 |
| Glycerin, crude | cwts. | 13,096 | 2,040 |
| Sodium chromate and bichromate | ,, | 7,260 | 4,798 |
| ,, carbonate, etc. | ,, | 563,138 | 495,460 |
| Paints and colours ground in oil or water | ,, | 49,040 | 36,955 |
| Ammonium sulphate | tons | 27,975 | 24,648 |
| Anthracene | cwts. | 1,978 | 2 |

Decreases.

| | | 1925. | 1924. |
|---|---|---|---|
| Unspecified coal tar products | cwts. | 29,530 | 48,676 |
| Glycerin, distilled | ,, | 10,172 | 12,555 |
| Caustic soda | ,, | 132,234 | 157,891 |
| Sodium sulphate (including salt cake) | ,, | 31,661 | 36,665 |
| Painters' colours (unspecified) | ,, | 45,150 | 51,020 |
| White lead (dry) | ,, | 5,884 | 13,806 |
| Acid, sulphuric | ,, | 1,464 | 4,781 |
| ,, tartaric | ,, | 808 | 1,192 |
| Ammonium chloride | tons | 267 | 513 |
| Naphtha | gals. | 5,019 | 31,628 |
| Naphthalene | cwts. | 2,034 | 10,909 |
| Benzol and toluol | gals. | 2,252 | 223,429 |
| Potassium nitrate (saltpetre) | cwts. | 1,016 | 1,780 |
| Unspecified potassium compounds | ,, | 2,732 | 4,350 |
| Potassium chromate and bichromate | ,, | 1,479 | 5,000 |
| Copper sulphate | tons | 4,271 | 12,216 |

# Expansion and Compression Phenomena in Steam Jets

## Discussion of Professor Mellanby's Paper

*We give below a summary of the discussion on Professor Mellanby's paper published in* THE CHEMICAL AGE *of last week and read before the Institution of Chemical Engineers on March* 11.

THE PRESIDENT (Sir Arthur Duckham) asked whether Professor Mellanby had tried experiments with re-compression on steam jets. He himself had been interested some little while ago in a heat pump process, and, instead of using a turbine for re-compression, he had experimented with steam jets. No very satisfactory results had been obtained. Professor Mellanby had shown the flow of steam in the nozzle, and he wondered what effect would be obtained if one tried to shape the nozzle to the theoretical flow found in one nozzle, so that there was not the turbulence that had been mentioned.

Mr. J. ARTHUR REAVELL, speaking of a diagram which had been shown of a nozzle with a tube down the centre, having an orifice for measuring the pressure, asked if there was any difficulty in measuring the pressure, due to the turbulence because of the tube down the centre. Had attempts been made to make measurements other than by means of that tube? With regard to steam jets for recompression, he said that his company had done a tremendous lot of work in that direction, and about 18 or 20 years' ago Mr. Kestner did a great deal of work on recompression. Whereas all the diagrams that Professor Mellanby had shown were based, if he understood rightly, on steam that was slightly superheated, in actual practice the steam going to the jet was saturated steam; in recompression they had vapours that were always wet, and he would like to know whether any work had been done to show what was the difference, or the lowering of efficiency, due to the wetness of the steam dealt with in practice.

Mr. W. A. S. CALDER said that in chemical practice they wanted to move comparatively small volumes of gas by means of steam jets, requiring only comparatively small pressure, say from 6 to 8 in. of water. Could Professor Mellanby give any idea of what the efficiency would be in an up-to-date properly-designed apparatus? He himself had not been able to find reliable data on that point.

Mr. F. H. ROGERS said that the question of turbulence within the jet had exercised his mind somewhat. Where there was an even flow through a jet or orifice, surely there must be a very great difference in the result obtained under those conditions as compared with conditions in which turbulence existed.

Professor E. C. WILLIAMS, speaking of the theoretical examination of pressures in a nozzle, asked whether Professor Mellanby could give the best dimensions and the best shape, the increase in the diameter of nozzles after leaving the throat, to perform a definite duty under a definite pressure head and back pressure head. Had anything of that sort been published, or could Professor Mellanby publish it, because it would be of very great practical value?

Professor J. W. HINCHLEY suggested that Professor Mellanby might describe in full in another paper all the work done with regard to convergent and divergent orifices. He had been particularly impressed with the statement made as to the heat efficiency of jets, and it was said that in the best of injectors the efficiency was of the order of 3 per cent. If chemical engineers knew more about the efficiency of injectors and ejectors, and so on, there would not be so many blunders perpetrated, and they would not hear so many wild statements with regard to heat pump work.

Mr. A. L. BLOOMFIELD, referring to the reason for the greater pressure ratios to be obtained with the convergent and divergent nozzles, said he did not quite follow why the subsequent divergence of the nozzle should enable the pressure drop to be increased without sacrificing efficiency.

The PRESIDENT said that reference had been made to the high efficiencies obtained with the short nozzle, and asked what was the limit of the shortness of the nozzle.

### Professor Mellanby's Reply

Professor MELLANBY, speaking of convergent and divergent nozzles, said the quantity of steam that was passed was fixed by the throat pressure, which was first calculated, and, knowing the steam which was to pass through, from that they calculated the area. Then they made the end section the right section to accommodate the right quantity of steam. They could have a long nozzle, with a gradual divergence, or a short one with a very rapid divergence. Experience had shown that they could not have it too rapid, but they could have it too long. The exact ratio depended upon the area of the end section. A very big pressure rise could be obtained without altering the quantity of steam passing. But the efficiency was altered very much. The steam was passing out at higher pressure, and its velocity would be much less.

So far as he knew, there was no work done upon the losses during compression; he did not know of any which could be depended upon, where one started from a low pressure and compressed up to a high pressure, and that was why he had brought the figures in the paper forward, as showing how big the losses must be. He had often intended to go on with compression work and carry out some direct experiments, and, after what he had heard that evening, he felt that he would do so. It was work that should have been done before, and he was amazed that the people who made these things had not done it.

With regard to the relation between the quantity of gas and steam, that was quite easily worked out. That was the problem that the designer of the jets for the condenser had to deal with every day. The trouble of forming a vacuum, of course, was nothing, if one had just the steam to get rid of; it was the fact that air was mixed with the steam that gave the trouble, and long experience had shown that, at least with ordinary everyday conditions of steam tightness, there was a certain quantity of air per thousand lbs. of steam, and from that the jets were designed. It was, after all, just a case of estimating the area to take so much air at a definite pressure. They knew its volume and velocity, and they had to assume that it was very much the same as the steam itself. But the subject really did want working out again, especially on the compression side.

With regard to the loss on entry, it was very interesting how loss was affected by the way in which the steam was made to enter. He had exhibited a slide illustrating a plate with a hole through it, which showed a low efficiency and a low quantity of steam passing through. If, instead of the edges of the hole being perfectly sharp, about 1/16th of an inch were taken off the edge, there was an increase of efficiency at once, and an increased quantity of steam passing through. If ¼th of an inch were taken off, the efficiency and steam quantity increased further. Nozzles could be obtained with an efficiency of 97 per cent., so that there was remarkably little entrance loss; when the entrance loss was compared with the total loss it was really very modest, and, since the efficiency of the whole was quite big, if the entrance loss were put in the form of a percentage it was very small indeed.

With regard to the question of the tube being a measurer of pressure, the fact that one obtained the same readings from day to day and from month to month, and that they were exactly what theory would indicate, went a long way to give one confidence that they did represent the true readings. There was another confirmation; instead of having the tube running through the orifice, small holes could be made along the orifice. One had to do that when dealing with turbine nozzles, which, as a rule, were curved. Holes had to be drilled, and, instead of getting pressures all the way along, one got three or four or more. If that were done, the same result would be obtained as with the search tube.

Mr. Reavell had mentioned that the steam was wet during expansion. That was just what we wanted to know. Was it wet? That was the whole point upon which all the discussions were going on with regard to super saturation. During the passage through the convergent and divergent nozzles, had the steam time to change into wet steam, or did it go through so rapidly that it had not time to change, but simply dropped in temperature and passed through as a gas? It was a very complicated problem. He knew of no direct way of trying it. They could only do it by indirect means, and he believed the method suggested in Fig. 6 of his paper did give some indication that there was some reversion to wetness, though he would not like to say what happened in a long nozzle or in an actual turbine.

# Review of Calcium Carbide Problems

## Chemists' and Manufacturers' Points of View

At a meeting of the British Acetylene and Welding Association at the Old Colony Club, Aldwych, London, on Monday, March 16, Mr. C. Coulson-Smith, Chief Chemist to Allen-Liversidge, Ltd., read a paper dealing generally with calcium carbide.

### Sampling

After giving a brief outline of the manufacturing process, he dealt with a subject of the utmost importance both from the consumer's and the manufacturer's point of view—viz., sampling. The present regulations stated that so many drums had to be opened from every consignment of carbide of various tonnage, and samples drawn by a technical expert and kept in an air-tight vessel. The sample on which the test was to be made must be drawn in equal portions from the top, middle and bottom of each selected drum. This, he suggested, was not a fair method for everyone concerned, and especially for the chemist who had to carry out the analysis. Take, for instance, the 100/200 size carbide; how could 30 lumps—about 30 lb.—be a representative sample of a 10-ton consignment when divided into two lots, 15 lb. for the seller and 15 lb. for the buyer for analysis, especially when the whole reason for sampling was that each party should obtain a similar portion? One lot might be homogenous, the other porous, with a lump of ferro-silicon included. Presuming the sample had been taken in this manner, what was the result?—4·8 c. ft. per lb. from one source, 4 c. ft. per lb. from the other. Methods of testing and analytical control were subject to discussion, and little thought was given to the method of sampling. Why could not the 100/200 size or any other size be subjected to crushing, say to 8/15 quartering and mixing. In this way both consumer and manufacturer's chemists would be able to carry out an analysis and obtain results which would really mean something. The manufacturers might say that decomposition would take place in the crushing, but if the crushing was done expeditiously and in a dry atmosphere there was less likelihood of a poor gas yield being obtained than if the present method of sampling was maintained.

### Estimation of Impurities

As to the estimation of the impurities in $C_2H_2$, the Standardisation Committee might give a little help to the chemist. The sulphur method was the most practical, and the phosphorus was not being liable to error. In the magnesia method, one had first to precipitate the phosphorus and give a prolonged ignition after allowing the precipitate to stand for 12 hours. This ignition was seldom satisfactory, because before obtaining the magnesium pyro-phosphate it had to be subjected to several weighings and further ignitions and coolings before a constant figure was obtained. A considerably quicker and more accurate method was that of precipitation of the phosphorus by means of a solution of ammonium molybdate, weighing the phospho-molybdate in a tarred gooch crucible and calculating the phosphorus in terms of phosphoretted hydrogen.

Dealing with the purification of acetylene, various materials were used to eliminate the impurities. Catalysts were sometimes used to help the chemical action. In the main these materials were of an acid character, either regenerative or not; others were of a supposed basic nature. Their action on the impurities were based chemically on the conversion of the sulphuretted hydrogen into sulphuric acid, and the phosphoretted hydrogen into phosphoric acid. In fact, oxidation of the impurities was affected, with, as a rule, a colour change of the purifying material.

In testing carbide a 10 per cent. solution of silver nitrate was usually used, but he had found a 1 per cent. solution quite as satisfactory.

### Is there a Use for the Residue?

Turning to the residue after decomposition of the carbide, this, of course, was slaked in lime, with traces of acetylene ferro-silicon, magnesium and carbon. It had a high calcium content, and on treatment yielded a lime of 95 per cent. CaO, and could be used in almost any process where a high-grade lime was required. By addition of other compounds it was possible to utilise this residue as a coal gas purifier, which was used in the "catch boxes" for removing the final traces of sulphuretted hydrogen. As a coating for electrodes for arc welding he had not found it satisfactory; as a limewash the smell was disagreeable, and even with additions of hardening agents had not met with success in America where mixtures were extensively tried out. The most remunerative and likely field for this present bugbear was in the building trade, as a sand lime or clinker brick, in which there was about 12–15 per cent. lime, 85 per cent. sand. These were intimately mixed, moulded, and subjected to pressure and dry steam at 150 lb. per sq. in., the resulting bricks having a crushing strength from 450–500 tons per sq. in. Good results had been obtained from this residue in agriculture, and there was a possibility of its use in the manufacture of bleaching powder and tan yards.

### Gravimetric or Volumetric Method

Mr. W. J. A. Butterfield asked whether any carbide manufacturers had made experiments with coke formed from the carbon from gas retorts? That might be very interesting, theoretically, because there were not the occluded gases found in charcoal, and it was a denser form of carbon than coke, and was substantially a pure carbon. He disagreed with the author in his preference for the gravimeter method of determining the yield of carbide, and doubted whether it was any better than a properly measured gas yield—i.e., the volumetric method.

Mr. Stephenson said he would certainly prefer the gravimeter method of determining gas yields because there were no fancy computations of barometric pressure, and it was possible to get a direct reading in litres per lb. or litres per kilo as preferred. Was there any satisfactory explanation of the claim by the American and Canadian carbide manufacturers that they never produced impurities in their carbide, and that therefore there was no need for subsequent purification? On the other hand, the Continental carbide certainly did contain impurities, as those who handled it knew.

Mr. R. Hoddle asked whether any explanation could be given as to why carbide to-day was not so pure as it was 15 years ago.

Mr. Wilfred Hill suggested the possibility of preserving carbide in better form when it had been packed for transit to long distances by giving it a slight coating of some mineral oil. He had done this many years ago, and it had prevented decomposition during transport.

The author, in the course of his reply, said he did not know anybody who had used retort carbon. As to the respective merits of the gravimetric and volumetric systems of measuring gas yields, the difference between the results obtained was, of course, the whole crux of this matter. He did not think at present that there was a generator which could be put down on a laboratory scale which gave perfect control from the volumetric point of view, and there was no doubt that in the majority of cases, where the gas yield was measured volumetrically, the result was in favour of the manufacturer. As to Mr. Hoddle's question why carbide to-day is not so good as it was some years ago; probably it was due to the fact that manufacturers were using less pure coal than they did.

### Decline in Quality

The President, in proposing a vote of thanks to the author, said that 20 years ago the quality of carbide was excellent, and that quality was maintained until the war. At that time the price was anything up to £25 per ton. Manufacturers then found that the only way they could develop the trade was to supply a cheaper article, and they looked round for suitable cheaper raw materials, and succeeded in finding them; hence the price of carbide came down, and just before the war it was being sold wholesale by the manufacturers at £11 per ton. Then the war came, and carbide manufacturers in this country were expected to manufacture carbide from almost anything. He manufactured 420,000 tons of carbide during the war for the British and Allied Governments, and at times he was asked to make it without raw materials. It was then suggested at one time that it should be packed in bags to save the cost of drums. When he told those responsible that he must have coal they referred him to some dump heaps up at Newcastle and gave him permission to use them, but when they scratched into these dumps they found that under the top layer of coke and ashes there was clinker from an old brick yard. As a matter of fact it was not until about one and a half or two years ago that we got back to anything approaching normal conditions from the point of view of raw material, but even now the quality of anthracite coal was not

dependable. At the same time it must be remembered that the quality of carbide varied considerably with the method of manufacture. For instance, a carbide manufacturer in a single-phase furnace had a texture altogether different from a carbide produced in a three-phase furnace. With some of the old furnaces used years ago in Canada the carbide, if examined under a microscope, was nothing but a huge sponge, and when it was put into water went off extremely rapidly. With the present-day system of manufacture, which was called the tapping process, a far denser carbide was obtained than by the old methods, but here, again, the result depended entirely on the raw materials used and the power factor of the process. There was a very great difference in the cost of producing a carbide to give 4·8 c. ft. of gas as compared with one giving 4 c. ft. of gas.

## The British Association of Chemists

### Qualifications for Membership

It has been the aim of the British Association of Chemists to unite the profession of chemistry in such a way that all who may possess the right to describe themselves as qualified may find a place in one organisation, the standard of which, without being narrow, demands a high degree of scientific knowledge and practical efficiency.

The Association has a right to congratulate itself that it has gone far to destroy the controversy concerning qualification, by reason of which no organisation of the profession has been possible heretofore. But at a time when the Association was in train to carry all before it, this controversy broke out with renewed vigour. Because of it, incalculable harm was done to the cause of unity; and no language is too strong to condemn the spirit of factious violence which gave it birth and the short-sighted obstinacy which maintained it. It would seem that those without paper qualifications were the first aggressors, but the academically qualified were not slow to contribute their share towards the maintenance of this unnecessary and unhappy dispute.

The Association recognises that, for the future, it is extremely undesirable that any but academically qualified persons should practise; but it realises that at present such a position cannot be maintained. It is impossible to close the profession until a representative body of practitioners demand it; and however distasteful the conclusion may be to some, a qualified body is not, at this time, a truly representative body.

The Association, therefore, admits to its membership some who are not academically qualified, and maintains that until it has obtained powers to regulate admission to the profession, no individual or group of individuals has a right to set up any arbitrary standard, and thus hinder the Association's work.

The standard required of those who are not regularly qualified is, however, necessarily high, for the executive has recognised that not all those who practise chemistry possess that degree of responsible initiative which a professional organisation can, and indeed must, demand. Those who are not qualified to become full members can, however, enter the Association as probationers or students.

The Association appeals first to those who are academically qualified, asking them to remember that regulation of entry to the profession cannot be obtained but by the demands of a representative and organised body; and that such a body must of necessity include some without paper qualifications. But the examination of such candidates is such that no academically qualified person need doubt that membership of the Association implies a degree of attainment that justifies professional recognition.

To those who are not academically qualified—amongst whom there are not a few opponents of academic qualifications—we would submit that some standard must be set up, and that the academic standard, with all its faults, is a practical if crude solution of our problem. Unity is above all things necessary; prejudice paralyses the efforts of those who strive for solidarity within the profession.

The aim of the Association is to organise the profession of chemistry as strongly as is organised the profession of medicine. It appeals to all who are eligible for membership to swell its ranks and assist in every way to further its aims.

Full particulars can be obtained from the General Secretary, The British Association of Chemists, Bedford House, 108, Baker Street, W.1. H. T. F, R.

## Ammonia and $CO_2$ Compressors

### Mr. E. H. Field on Recent Developments

Mr. E. H. Field, of the Blackfriars Cold Storage Co., in the course of a paper on developments in ammonia and $CO_2$ compressors read by him at a meeting of the Institution of Engineers-in-Charge, at St. Bride's Institute, London, on Wednesday, March 11, dealt with the general principles governing modern refrigerating plants in cases in which high efficiency was obtained. In the compression system—the only one which nowadays merited consideration—there were, he said, four essential elements:—(1) the compressor, which, drawing the evaporated gas from the evaporator, compressed it at a higher pressure and temperature into (2) the condenser, where the gas parted with its sensible and latent heat to the cooling water passed over, through or round the condenser pipes, and became a liquid, which was led to the (3) expansion valve, an ordinary screw-down valve, and then to the (4) evaporator, usually consisting of one or more coils of pipes, in which the ammonia or $CO_2$ liquid was re-evaporated into a gas, absorbing the heat from the surrounding brine, beer, water, air or whatever else had to be cooled.

The refrigerating plant consisted of two parts: the high pressure portion in which the condensation of gas was effected, the gas giving off heat to the condensing water; and the low-pressure portion, wherein the evaporation of the liquid took place. Generally, the nearer the two pressures or temperatures were to each other the more efficient would be the plant—in other words, a smaller amount of power would be required to obtain a given refrigerating effect. Unfortunately, however, there was a fundamental difficulty in obtaining from any machine results which came to that degree of perfection owing to the fact that the working medium, ammonia or $CO_2$, entered the evaporator coils through the expansion valve at the temperature at which it left the condenser, therefore before it could perform its function of extracting heat from the substance surrounding the evaporator coils it obviously must be cooled to the low-level temperature, which meant an unavoidable loss.

A refrigerating plant would extract heat, within the limit of the physical properties of the refrigerating agent used, from any substance at one temperature and transfer it to another substance—the condensing water, for example—at some higher temperature. For the passing of heat from one body to another it was essential that the bodies should be at different temperatures; the greater the difference the more rapid was the flow between the two bodies. As, to induce the heat to exchange, an engineer had to get some difference between the cooling body and the cooled body, the problem was what the difference should be. He thought it would be taken for granted that an all-round figure was about 10° F.

## Moth-proof Fabrics

*To the Editor of* The Chemical Age.

Sir,—In your issue of January 24 (p. 70) you refer to a German process of moth-proofing. We are glad to inform you that we are not behind Germany in that respect as, after several years of research, we have succeeded in developing what we believe to be the most rational treatment for the proofing of textiles against clothes moth.

The treatment is being patented throughout the world, but the disclosure of the nature of the substance is not advisable at this time—suffice it to say that the material is extremely easy to apply, involving no complicated technique, does not change the normal characteristics of the fabric, and fabric so treated may be subjected to ordinary washing or dry cleaning without impairment. We may add that the treatment may be applied either during the course of manufacture of the fabric, or made-up garments may be proofed by simply immersing in a solution of the active principle in dry cleaners' spirit.

You may be interested to know that the same active principle is effective against a wide variety of insect pests, among them the Death Watch Beetle, the product having already been supplied commercially to several famous cathedrals, churches, etc., to combat this pest.—Yours, etc.,

Kenford, Ltd.,
W. S. Whitelaw,
London, March 13. Director.

## Chrome Pigments: Applications and Properties

### Discussion Among Oil and Colour Chemists

At the meeting of the Oil and Colour Chemists' Association in London on Thursday, March 12 (Dr. Houlston Morgan, President, in the chair), Mr. W. J. Palmer read a paper on "Chrome Pigments: Some Applications and Properties."

The chromium pigments, Mr. Palmer said, could be roughly divided into two main sections: (*a*) those containing the group $Cr_2O_3$ (chromic oxide) and (*b*) those containing the group $CrO_3$ (chromium trioxide). The latter was the more important group if for no other reason than that to it belonged the lead, zinc and other metallic chromates well-known for their pigmentary properties; but the first section contained such well-known colours as chromium oxide and Guignets Green. Chromium oxide green had rather a restricted field of application, but its great permanency to sunlight should alone appeal to the paint manufacturer who wanted to produce greens in which the pigment would outlive the medium. Owing to its perfect stability to acid, alkali, and almost all chemical influence at ordinary temperatures, chromium oxide green was particularly suitable for decorative tile work, as the colour could be relied upon to remain.

Passing to a consideration of a few pigments of group (*b*), *i.e.*, the $CrO_3$ group, Mr. Palmer said the barium and strontium chromates had practically passed out of use as commercial pigments. The most important member of this group was lead chrome. Lead chromates and lead sulphate chromates were, without doubt, the most important of all the chromium-containing pigments. They possessed many of the properties of a good pigment, their brilliance and intensity of hue ranging from the palest primrose to the deepest red, which, together with excellent body or obliterating power make them exceedingly valuable. If it were not for their being so sensitive to gaseous sulpho-compounds, always associated with the atmosphere of large cities, they would be the pigments par excellence for both decorative and protective work but for one other consideration. From their composition, it was obvious that all these chromates were anything but stable in the presence of any organic substance which was readily oxidised and this, in effect, was what actually happened in any film of paint containing lead chromate when exposed to the direct action of sunlight, especially under tropical conditions, where oxidation of the oil medium with simultaneous reduction of the chromate constituent caused rapid decay and disintegration of the film.

### Lead Chromates as Protective Pigments

Conditions were different, however, when a paint of this description was designed for service as an undercoating or priming. No consideration of lead chromates as protective or anti-corrosive pigments would be complete without drawing special attention to the exceedingly valuable properties of basic lead chromate when used in the preparation of protective coatings for iron and steel structures. If there were no other considerations but protective value, then the most basic pigment would, on results, take the premier position, but unfortunately its highly crystallising structure made it a very unsatisfactory pigment from which to produce a good working paint and one with satisfactory covering power. It was possible, however, to manufacture a deep orange chrome containing quite a large percentage of true basic chromate which still retained, to a very high degree, the anti-corrosive properties and be capable of being compounded into a highly satisfactory working paint. He had no hesitation in saying that, irrespective of price, there was no better pigment to use for priming paints for iron and steel.

Of the many industrial applications of chrome pigments, one of the most important was in the textile industry, where they were utilised to obtain self-coloured and decorative designs and effects on wool, silk and cotton cloths. Their most extensive use to-day was in the printing of cotton fabrics, although it was not many years since large quantities of primrose, lemon, golden, orange and green cotton yarns were regularly shipped to the Eastern markets, the colour being due to lead chrome precipitated in the fibre, the colours being particularly pleasing and effective.

Mr. Palmer described the methods for applying chrome pigments in the textile industry and the two general processes for producing designs on dyed fabrics known as the resist and discharge processes, and then passed on to a review of a few of the properties and characteristics of lead chromes, confining himself to that part of the subject which appealed to those who used them for the manufacture of paint, enamel and printing ink.

Finally, Mr. Palmer referred to the method often employed of adding lead sulphate either in the precipitation vat or in the dry grinding operation afterwards, and then marketing the product as genuine chrome. This was to be deplored, and it was a matter of regret that such combinations of sulphate and chromate of lead would often meet the requirements of many specifications issued by public bodies, which only stated that the chrome must consist of lead chromate and sulphate. Similar conditions applied in many specifications for Brunswick greens.

The President, in thanking the author, referred to the question of stabilising primrose lead chromates. It did not seem to him that it should be very difficult to stabilise normal lead chromate in the more or less colloidal condition. Similar things were done in other industries and if, in the oil and colour industry, they could stabilise yellow oxide they ought to be able to stabilise lead chromate. Before long Mr. Palmer might come along with a paper showing how it could be done. In specifying Brunswick green it seemed to him that there must be a chemical composition clause in addition to physical tests. Putting in a plea with regard to the nomenclature concerning pigments, the President said that this would be under the consideration of the British Engineering Standards Association; as an example, he mentioned the confusion caused now by calling chromium oxide green chrome green, the latter being also associated with pigments consisting of mixtures of lead chromate and some sort of Prussian blue.

### Will Chrome Yellows Disappear?

Mr. J. B. Shaw (British Dyestuffs Corporation) expressed the view that the pigment type of yellows which are now coming out would supersede chrome yellows eventually.

Mr. Palmer, replying to the point concerning Brunswick green, said there were specifications in which the wording would imply that Brunswick green was to consist of ferrocyanide blue and lead chrome, which consisted of chromate of lead and sulphate of lead, without any further chracteristics or definition as to the strength value, and this allowed the manufacturer, if he felt so inclined, to load the mixture with an excessive amount of lead sulphate, so that there would be a low percentage of chromate of lead which admitted of a small proportion of ferrocyanide blue. This uncertainty was very prejudicial to manufacturers, because it was impossible for them to know what they were tendering against, and whether they might be offering a quality very much superior to somebody else's material which nevertheless came within the specification.

## Openings for Silicate of Soda.

*To the Editor of* The Chemical Age.

Sir,—With reference to the article by Mr. Rex Furness in The Chemical Age (Vol. XII, No. 292, January 17, 1925, p. 48) "Some New Uses of Silicate of Soda," I shall be extremely obliged if you can put me in touch with the writer and with the manufacturers of the various types of this chemical. (I presume Brunner, Mond and Co. are the largest manufacturers.)

I am particularly interested in the use of sodium silicate as (1) an adhesive, (2) a barrel and box lining and lining for latex coagulating tanks, (3) treatment of concrete floors and roads. There may be a considerable use in these directions in this country.

If any firm can send me small samples of a pound or so of the different types, stating the specific applications of each type, I shall be extremely obliged.

I might mention that this department is a subscriber to The Chemical Age, which I find very useful and interesting. Thanking you for your kind assistance in this matter.—Yours, etc.,

J. Eaton,
Agricultural Chemist, S.S. and F.M.S.
Department of Agriculture, Straits Settlements and Federated Malay States, Kuala Lumpur.
February 19.

# Chemistry's Relation to Agriculture

## Potash Fertilisers

THE sixth lecture on " Chemistry in its Relation to Agriculture " was given by Mr. E. Holmes at Birmingham University on March 11. The earliest forms of potash to be used as fertilisers, he said, were plant ashes (" pot ashes ") containing the crude carbonate, from straw and bracken, and kelp from deep-sea seaweed. The ash of young wood contained up to 35 per cent. of potash, while that of older wood, in which the cellulose had largely lignified, contained only 15-25 per cent. The potato crops of Canada benefited from the application of wood ashes at the rate of forty bushels per acre, particularly on virgin soils.

The old system of agriculture, whereby the grain was sold and the straw returned, as manure, to the soil, tended to use up the phosphate and conserve the supply of potash. But with the later demand for such potash-needing crops as mangolds and potatoes in this country, and sugar-beet on the Continent, there arose a necessity for a cheap supply of potash salts. At the present time the chief sources of potash were the crude salts from Germany and Alsace, and to a smaller extent to the naturally occurring minerals such as leucite. Before the war the only economic sources of potash worked to any large extent were the Stassfurt deposits in Saxony. These consisted of the mixed salts, chlorides and sulphates, of sodium, potassium, calcium and magnesium, and were mined at depths of 800–1,000 ft. The products used agriculturally were kainit, a mixed salt consisting of mgnesium and potassium sulphates with magnesium chloride, and in the crude state containing about 12 per cent. of potash (as $K_2O$) ; sylvin, a crude potassium chloride containing 12 per cent. of potash ; and carnallite, a mixed potassium magnesium chloride, containing in the crude state 9 per cent. of potash. Carnallite was used extensively in Germany, but was too hygroscopic, and had too small a potash content to make its export profitable. Besides these the purer single salts, potassium chloride and sulphate, were manufactured and were correspondingly concentrated fertilisers suitable for export. The Alsatian deposits occurred in the plain to the north of Mulhouse, and, although discovered in 1904, were not developed until the war owing to the controlling interest possessed by the German syndicate. The main salt now obtained was sylvinite, mainly potassium chloride, but with variable amounts of common salt, magnesium chloride and calcium sulphate. Owing to their high potash content, varying from 15-25 per cent., and their ease of working and extraction, these salts were rivalling the German deposits, but the ultimate amounts of salt available were greatly in favour of the German interests. Other deposits of potassium salts are known at Erythrea in Spain, in Abyssinia, and in several American States.

At various times many potash-bearing minerals had been suggested as sources of potash for plant food. Of these leucite was now fairly extensively used in Italy. The iron impurities were extracted by magnetic separators and the finely ground material applied directly to the soil. It had been stated that on some soils the mineral had given as good results as potassium sulphate. Most of the potash-containing minerals, such as orthoclase felspar, were too stable to give immediate results, but it seemed possible that their slow weathering in the soil over a period of years would give economic amounts of soluble potash. In any case these minerals were the only source of potash in most virgin soils.

During the war blast-furnace flue dust was applied directly to the soil as a potash fertiliser, but at the present time this dust was extracted for its potassium salts, which were used in ordinary industrial processes. In a few cases reported during the war these dusts proved toxic to plant growth owing to the presence of small amounts of cyanides and thiocyanates.

The part played by potash in plant economy was complex. It facilitated the production of sugar and starch in the leaves of plants, and assisted in the transfer of the former to the roots of such plants as mangolds, sugar-beet and potatoes. Hence its necessity for these crops. These conclusions were well borne out in the Rothamsted experiments on mangolds. In one experiment two identical plots were sown with mangolds. One plot then received ammonium sulphate, superphosphate and potash, while the second had ammonium sulphate and superphosphate only. Although conditions of lighting, carbon dioxide and water supply were identical in both cases, and the yields of leaf per acre were comparable, the first plot produced two and a half times the amount of roots. On analysis the sugar content of the two samples showed the same ratio—i.e., $2\frac{1}{2}$ to 1.

Potash also stiffened the straw of cereals, and it helped the plant to resist adverse conditions of climate, temperature, soil and disease.

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# Modern Methods of Sheet Glass Production

## Description of Latest Processes

PROFESSOR W. E. S. TURNER (of the Department of Glass Technology at Sheffield University) gave a lecture on modern methods of producing sheet glass, before the Royal Society of Arts, in London, on Wednesday, March 4.

He emphasised the growing importance of the sheet glass industry in this country, on the Continent, and in America. In the number of factories operating, this country stood low in the list, but the two which were actually operating were of very great size and importance, and stood in the front rank of glass factories in the world. Our imports of glass had been steadily reduced since the beginning of the century, whilst our exports had steadily increased.

The day of the hand-operator in sheet glass production was rapidly disappearing, except for special types of glass, and the machine was rapidly displacing the hand-operator. The lecturer discussed the Lubbers method, which produced cylinders by machinery. This method resulted from experiments by J. H. Lubbers, of Pittsburg, which were begun in 1894, but the process was not commercially successful until 1905. It was an adaptation of the hand method.

### Newer Direct Processes

Two newer processes, in which glass was produced directly in the form of sheets, were then described ; of which the inventors were Fourcault, in Belgium, and Colburn, in America. The success of the method depended upon the drawing slot which was used. The lip of the slot was depressed some distance below the outer wall, so that a hydrostatic head was formed, and caused the glass to well up through the slot. Another essential feature of the slot was that it was wider in the middle than at the ends, so that a greater quantity of glass was supplied to the middle of a sheet than to the edges, and in this way the difficulty with regard to the tapering of the sheet was met. Factories were operating on this process in Belgium, Czecho-Slovakia, Holland, Greece, Germany, France, Italy, U.S.A., China, and Japan.

The Libby-Owens process resulted from the experiments of Mr. I. W. Colburn from 1905 onwards. It became a commercial success in 1916, and production commenced about 1918. In this case there was a tank furnace feeding glass through the refining end into a trough, made of fireclay, with burners underneath, to maintain the temperature of the glass in the trough at a suitable level for drawing. The width of the sheet was maintained mechanically, by two pairs of rollers, one on each side of the sheet, just inside the drawing trough. These rollers were knurled or cogged, and gripped the glass as it emerged from the trough. The process was started by lowering a " bait," consisting of a rod or bar of iron, 2 or 3 inches wide, and 6 ft. long, attached to flexible metal strips. With regard to plate glass, Professor Turner described the Ford plant at Detroit, U.S.A.

Mr. E. A. COAD-PRYOR, referring to the continuous production of plate glass, asked whether there was a tendency to produce stringy or cordy glass, which would have to be rejected.

PROFESSOR TURNER said that with regard to stringy and corded glass, the glass which was fed from a tank furnace was not free from those defects, but when he was at the Ford works he had not seen much evidence of these defects.

The lecturer gave the essentials of a number of recently proposed processes for the utilisation of rock phosphates, and closed with some theories as to the mode of assimilation of phosphate by the plant.

# Prof. Baly's Impressions of America

## A Survey of the University System and its Advantages

THERE was a large attendance at a general meeting of the Liverpool and North Western Section of the Institute of Chemistry, which was held in the Chemical Theatre of the University of Liverpool, on Thursday, March 12, when Professor E. C. C. Baly, F.R.S., F.I.C., delivered an interesting lecture on his recent tour in America. Members of other scientific societies were present in large numbers.

Professor BALY, in introducing his subject, said that a stay of eight weeks was both too long and too short to justify his saying much about America, but it was long enough to gain a few impressions. The route laid out for him was as follows: After visits to the American Chemical Society meeting at Cornell University, to Philadelphia, and to Washington, he travelled from Rochester to Seattle *via* Chicago, Omaha, and Salt Lake City; from Seattle to Los Angeles and Pasadena, *via* Portland and San Francisco; from Pasadena to New Orleans *via* Grand Canyon, Tucson and Houston; lastly, *via* Cincinnati and Pittsburgh, to New York.

### Anglo-American Entente

America might be divided into four parts, East, Middle West, West, and South, and there were differences between these which in some respects were quite striking. In general, the American differed from the Englishman in his freedom from self-consciousness, and he responded with readiness to fraternal advances, with the result that mere acquaintance ripened into true friendship with a speed that would seem scarcely decent to an insular Briton. In the West and South he met everywhere a very deep-felt admiration for England, and was many times asked publicly to encourage their hopes of a real entente with this country. He learned that there were three reasons for this admiration, namely the South African constitution, the Irish Settlement, and the funding of our debt to the States. These three acts of England had undoubtedly laid the foundation of a respect and appreciation for our country which were real and lasting. Of American hospitality he spoke in no measured terms. To him it was bounded by nothing except the limitations of the time he was able to spend in each city. His own lot was largely cast amongst men of science, and their whole-hearted appreciation of new discoveries, whether American or English, was most inspiring, and he frankly confessed that his experience of the American faculty of constructive criticism was a most exhilarating one.

### American Universities

The American Universities needed at least one whole lecture to themselves, and he found it difficult in a few words to give any adequate account of them. On the one hand there were the world-celebrated universities such as Harvard, Yale, Cornell, Princeton, Leland Stanford, the Californian Institute of Technology, whilst on the other hand there were the State Universities, too numerous to mention by name. To us in England the latter presented a peculiar interest in that they realised an ideal not yet understood here. This ideal embraced two main features. Each State possessed its own university which provided free education to all citizens of the State who were qualified, and the whole expense was borne by that State. He was fortunate in being able to visit nine of these State-aided universities and to become well acquainted with their work and their government. It would be unfair to them to say that no fault could be found, for the Americans themselves were the first to realise that in some respects their ideals had not yet been entirely realised, but the lacunæ were such as were bound to occur, owing to the fact that achievement always lagged behind ambition. Two things impressed him most, first, the high standard of research work carried out in spite of the overload of routine teaching, and, second, the high-souled understanding of the true university ideals shared by the presidents with the boards of trustees.

### The Need for State Co-operation

The Professor said he returned home a convert and was eager to preach the same ideal in this country. One could not but deplore the damning effect of the financial embarrassment felt by so many of our own universities, and he for one held the view that no qualified boy or girl should be precluded from obtaining a university education by the want of money. He believed that they might graft the American ideal on to their own university tradition and achieve a noble system whereby the universities and the State worked hand in hand for the higher education of all those who were fitted to receive it. He pleaded that university education was a national asset and so to be considered. "To-night," he said, "is not the time to formulate a scheme for the realisation of this ideal, but I urge with all my heart its outstanding importance and its national value."

One of his best impressions of America was the great work done by the alumni for their old universities. At any rate in our younger universities this was quite unknown. Students passed out into the world after graduation, and their connection with their Alma Mater ceased. In America, possibly owing to the system of Fraternity and Sorority Houses, all university men and women gained a true university spirit that did not die when they left but found expression through their own alumni associations. Many times university professors showed him a building bearing a tablet "Erected by the class of 1919," or whatever the year might have been. One could well picture an alumnus visiting his old university and seeing such a tablet and saying "That was my year; thank God I was able to help." Once again he felt that they might do well to follow the example of their cousins overseas. In some respects our younger universities could never hope to emulate the American Universities with their great architectural beauty. It would be invidious to make comparisons, but he challenged anyone to gaze unmoved on the fascinating beauty of Leland Stanford, or to see without envy the State University of Louisiana being entirely rebuilt to a noble design on a personal gift of 10,000,000 dollars. No doubt the Americans possessed undoubted advantage in the spaciousness of their sites, but full credit was due to them for their understanding of the value of real architectural beauty in creating true university ideals.

A hearty vote of thanks was accorded Professor Baly for his lecture.

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# Chemical Matters in Parliament

### Sugar Beet Guarantees

The Financial Secretary to the Treasury (Mr. Guinness) (House of Commons, March 5), in reply to a question, said that the total guarantees for sugar beet factories given under the Trade Facilities Acts amounted to £520,000.

### Boric Acid in Food

Mr. Hardie (House of Commons, March 9) asked the Minister of Health whether 20 grains of boric acid, which might be found in a reasonable meal, were not injurious. It was stated in replies that such preservative would be likely to have a deleterious effect, and that steps had been taken to deal with the matter.

### Dyestuffs Act

Captain Wedgwood Benn (House of Commons, March 10) raised the question of the action of the Dyestuffs Licensing Committee in asking merchants who made application for leave to import a dye to give the names of the customers on whose behalf they were applying. It was stated that these names were distributed to "rival" firms who applied to the customers and sought to meet their needs. He also cited a specific case where a firm had been refused a certain French ink, although they had proved that the British ink available was useless. Sir P. Cunliffe-Lister said that he had no information on which to deal with the specific case mentioned, but that with regard to the demand for customers' names, only in special cases was this necessary, and out of 443 applications in January only 12 agents were asked for these details.

### Employment in Fine Chemical Industry

Mr. T. Thomson (House of Commons, March 11) asked the Minister of Labour if he could state, for a date early in 1921, what was the total number of men employed in the manufacture of fine chemicals; and the corresponding number to-day.

Sir A. Steel-Maitland said that the only available figures showed that in June, 1921, the total number of men of 20 years and over, inclusive of employers, managers, etc., engaged in the manufacture of drugs and fine chemicals in Great Britain was 11,442. He had no figures for to-day.

# From Week to Week

A FIXED NITROGEN PLANT is to be erected at Maehrisch-Ostrau for fertiliser manufacture by the Czechs, according to German reports.

THE HONORARY DEGREE of D.Sc. of Trinity College, Dublin, is to be conferred on Dr. F. G. Hopkins, Dunn Professor of Biochemistry at Cambridge.

DR. OTTO FISCHER, professor of chemistry at the University of Erlangen, is retiring, and will be succeeded by Professor Rudolph Pummerer, of Griefswald.

FOR FAILING TO ABATE A SMOKE NUISANCE at their works, C. H. Smith, Ltd., glue and size manufacturers, of Red Bank, Cheetham, were fined £5 at the Manchester Police Court on Wednesday.

MR. A. A. ROBERTSON, manager of the Australian Alum Co., Runcorn, and Mr. T. A. Johnson, chemical works manager, Northwich, have been returned as members of the Cheshire County Council.

RECENT NEGOTIATIONS between the American Cellulose and Chemical Co. and the Eastman Kodak Co. have resulted, it is stated, in an agreement for the supply of film matter from the former to the latter.

THE "BOVERTON REDWOOD" MEDAL was presented to M. Paul de Chambrier, a well-known French petroleum engineer, at the annual dinner of the Institution of Petroleum Technologists, in London on Tuesday.

AT THE HEBREW UNIVERSITY, JERUSALEM, to be opened by Lord Balfour, on April 1, the Chemical Institute will be directed by Professor Fodor, of the University of Haller. Sir Alfred Mond is a member of the Central Board of the University.

AT A MEETING of the West of Scotland Iron and Steel Institute, held at Glasgow on Friday, March 13, Mr. Edgar C. Evans, B.Sc., technical head of the Fuel Department of the Federation of British Industries, read a paper on "Fuel in the Iron and Steel Industry."

METHODS OF COLLECTING under the 26 per cent. Reparation levy on German exports are once more the subject of negotiations between the British and German Treasuries. A new formula has been devised which, it is hoped, may shortly result in a satisfactory solution.

MR. ARTHUR MARSDEN, F.I.C., was re-elected hon. secretary of the Bristol Section of the Society of Chemical Industry at the annual general meeting last week. A paper was read on "The Effect of Impurities on the Properties of Tin," by Messrs P. G. J. Gueterbock and G. N. Nicklin.

AT THE ANNUAL MEETING of the shareholders of W. Canning and Co., chemical manufacturers and factors, etc., Birmingham, held on Monday, Mr. Ernest Canning (chairman) said that the directors did not feel that to-day the prospects of business generally were of such a favourable character as they were two or three months ago, and there was still a large amount of stagnation in many branches of the metal trade. Mr. T. R. Canning was re-elected a director.

AT LEEDS ASSIZES on Wednesday, before Mr. Justice Branson, William Brooksbank Chambers (49), George Frederick Brooksbank Chambers (46), and Walter Peel (34), all dyers, and members of the dyeing firm of W. and G. Chambers, Dudley Hill, Bradford, pleaded guilty to making false statements and returns to the Income Tax authorities, and to conspiracy to defraud in connection with Income Tax. The two Chambers were fined £500 each and Peel £250. The Judge said that the only reason why he did not sentence them to imprisonment was because their employees would be thrown out of work.

DR. E. W. SMITH, F.I.C., speaking on Thursday at Birmingham, at a dinner of the Midland Junior Gas Engineers, said that with regard to education the one outstanding thing wanted was a qualification other than that of being an engineer on a gas undertaking. Arrangements should be made so that in future there should be a definite minimum qualification; and he pointed to the importance of a good knowledge of chemistry and chemical engineering. The very quintessence of chemical engineering was gas engineering. Dr. Smith considered that coke and its possibilities had been neglected. Really good coke was better than many of the patent fuels that were obtainable only at a much higher price.

A CONCERT was given by the Birmingham and Midland branch of the British Association of Chemists at Birmingham on Monday.

THE MOND NICKEL CO., LTD., announce that on and after Wednesday, March 25, the offices of the company will be at Victoria Station House, Victoria Street, London, S.W.1.

SIR JOHN RUSSELL, director of the Rothamsted Experimental Station, lectured at Newcastle on Tuesday on "The Soil," and dealt with the question of plant foods and fertilisers.

SIR MAX MUSPRATT was a member of the deputation from the Federation of British Industries which interviewed the Chancellor of the Exchequer on the subject of taxation in London on March 12.

THE NEW RESEARCH DEPARTMENT recently established at the Textile School of the North Carolina State School will allow laboratory research on the testing of dyestuffs, sizes, and chemicals used in the cotton milling industry.

THE SOCIETY OF GLASS TECHNOLOGY, Sheffield, has established a small Research Fund for the purpose of promoting research in relative subjects. Grants will be made to assist in conducting specified items of research approved by the Council.

THAT THE GOVERNMENT should take steps to increase the supply of fertilisers at a reduced cost, to enable the farmer to use greater quantities, was a resolution passed by the Shropshire branch of the National Farmers' Union on Saturday, March 14.

A NEW PROCESS for obtaining pure crystallised aluminium oxide by electro-thermic methods has been tried on an experimental scale by Ture Haglund, a Swedish mining engineer, at one of the leading European aluminium works, and is to be tested on a commercial scale.

A COMMITTEE HAS BEEN APPOINTED by the Board of Trade, consisting of Sir Arthur Whinney (chairman), Mr. Arthur Hollins, and Sir R. Henry Rew, to inquire into and report upon an application made by the Fertiliser Manufacturers' Association, Ltd., under the safeguarding of industries, for the imposition of a duty upon superphosphate.

THE FEED WATER SPECIALISTS CO., of Liverpool, in reference to the report in THE CHEMICAL AGE of last week of Mr. E. W. Lewis's paper on the softening of hot water supplies, point out two typographical slips. In some cases, the name "Mr. Wells" was wrongly substituted for "Mr. Lewis," and "the colloidal state of water" in the second paragraph should have read "the colloidal state of matter."

THE SOCIÉTÉ DE CHIMIE INDUSTRIELLE, of 49, Rue des Mathurins, Paris, announce the publication this year of an important work, 1914–1924: *Ten Years of Scientific and Industrial Effort*. In its 3,000 pages will be given a comprehensive review of all chemical industry developments in the critical period mentioned, contributed by recognised authorities in the scientific and industrial world. The price to subscribers up to June, 1925, will be 120 frs., after that date, 200 frs.

AT THE SHOREDITCH CORONER'S COURT, on Friday, March 13, an inquest was held with reference to the death of Mr. Alexander Byron, of Clapton, head laboratory assistant to Allen and Hanbury, Ltd., chemists and wholesale druggists, Three Colts Lane, Bethnal Green. On March 11, Mr. Byron stated that he had drank from a bottle that he thought at the time contained sulphate of sodium, which he was taking as a medicine, but afterwards found that it contained strychnine, which was one of the component parts of Easton's syrup. Death was due to strychnine poisoning, and a verdict of "Death from Misadventure" was returned.

AT A MEETING of the Birmingham and Midland Section of the Society of Chemical Industry on Tuesday, Mr. H. T. Tizard, of the Department of Scientific and Industrial Research, gave an account of recent work on gaseous explosions. The object of the lecture was to show how recent laboratory experiments had enabled the theory of the internal combustion engine to be placed on a sound scientific basis. The lecturer said Professor Burstall, of the Birmingham University, and Professor Bone were greatly advancing knowledge on the properties of gaseous explosions, and their work linked up with that of Ricardo. Professor G. T. Morgan, who presided, said that the question of gaseous explosions was becoming increasingly important.

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AMMONIA.—The synthesis of ammonia. Part I. G. Claude. *Bull. Fed. Ind. Chim. Belg.*, January, 1925, pp. 1–16.

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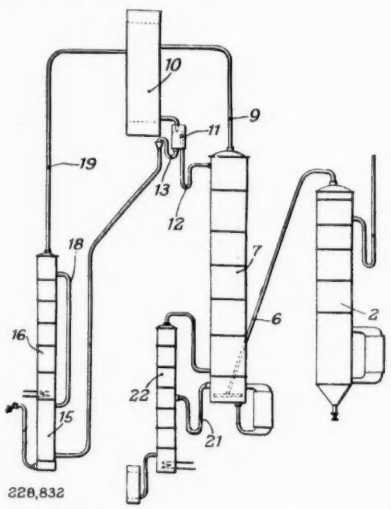
# Patent Literature

## Abstracts of Complete Specifications

228,832. Dehydration of Volatile Fatty Acids, Process for. E. Coppée, 103, Boulevard de Waterloo, Brussels. Application date, November 6, 1923.

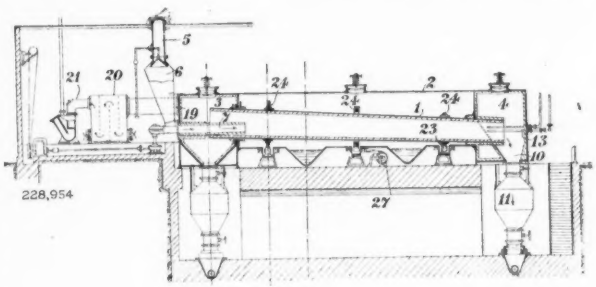
This process depends upon the known fact that a mixture of two liquids A and B may be separated by distillation, by adding a volatile substance C insoluble in A and soluble in B. A mixture of vapours (C+A) in the proportions having the minimum boiling point distils over leaving the constituent B. As C and A are not miscible, they may be separated by decantation and the product C used again. This process is applied to the dehydration of fatty acids by adding toluene or an ester such as methyl butyric ester, which are insoluble in water and have lower boiling points than the acid. The mixture is distilled, leaving the dehydrated fatty acid in the still. The acid, which may be of 6–7 per cent. strength, is distilled in a column 2, and the vapour passes through a pipe 6 to the bottom of the column where it bubbles through the concentrated acid in the column. Some of the ester is previously introduced into the column and it is subsequently




continuously supplied through the pipe 12. The vapours pass out through the pipe 9 to a cooler 10, and constitute the water-ester standard mixture. The ester is decanted in a vessel 11 and returned to the column 7, and water passes through the pipe 13. When toluene is used this water is pure, but when methyl butyric ester is used, it may contain some of the ester. In this case the water passes into an exchanger 15, and then through a pipe 18 into a small column 16, in which the ester is separated and driven off through a pipe 19 to the cooler 10. The concentrated acid is drawn off from the bottom of the column 7 through a pipe 21 to a column 22, in which the last traces of water and ester are driven off. The ester can only be removed in this way if a corresponding quantity of water also passes into the column 22. A special preliminary treatment is employed for concentrating acetic acid before treatment in this process. The process is applicable for treating formic, acetic, propionic, butyric acids, etc.

228,954. Active Carbon, Process for the Production of. J. N. A. Sauer, and Algemeene Norit Maatschappij, 2, den Texstraat, Amsterdam. Application dates, August 9, 1923, and May 9, 1924. Addition to 198,328. (See The Chemical Age, Vol. IX., p. 129).

The carbonaceous raw material is granulated to 1–5 mm. in size and is subjected in suspension in thin layers or streams to the action of heat and gas or vapour in a rotating furnace situated in a gas-tight casing, the rotation being produced by an external motor so as to exclude the admission of air. Gases for activating or purifying the material, such as steam, carbon dioxide, chlorine, volatile chlorides, hydrochloric acid, nitric acid, or ammonia, may be blown into the retort. The retort 1 is fixed within a casing 2 and projects into an inlet chamber 3 and outlet chamber 4. The internal firebrick ining of the retort may be provided with inlets or channels




for the admission of gases or the retort may be heated by internal surface combustion, the gases passing through the pores of the refractory material. Air or oxygen may be introduced into those parts of the retort where combustion of the evolved gas is desired. The raw material, which may be peat, wood charcoal, peat coke, brown coal, lignite, cannel coal, anthracite, or the like, is charged through the hopper 5 and shoot 6 to a conveyor 7, and thence into the retort. The finished product passes through a shoot 10 to a receiver 11 out of contact with air. Steam, vapour, or gas is introduced through pipes 13 and withdrawn through conduit 19, dust extractor 20, and water seal 21. The retort 1 is rotating by gearing 23, 24 within the casing 2, rotated by a motor 27 outside the casing.

The inner and outer casings may be maintained at a pressure slightly above atmospheric, the pressure in the outer casing being slightly higher than that in the inner. The finished product may be cooled by inert gas such as nitrogen, and may be purified by means of chlorine or sulphur dioxide. The raw material employed is of high density when it is desired to produce active carbon for gas adsorption, but may be of lower density when the product is desired for decolorising, purifying, deodorising, or sterilising liquids. This apparatus may be used to produce activated carbon of low apparent specific gravity, *e.g.*, down to 0·1, the real specific gravity being up to 2·2. Compare the process described in 228,582 (see The Chemical Age, Vol. XII., p. 255).

228,959. Oxygenated Organic Compounds, Manufacture of. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, August 23, 1923.

Mixtures of oxides of hydrogen and carbon may be treated at a high pressure and temperature in contact with a suitable catalyst to yield methanol or other oxygenated organic compounds. It is found that when this reaction is effected on an industrial scale, the catalyst soon loses its efficiency and secondary reactions occur. This is due to the fact that the gases purified in the usual manner are not sufficiently pure, and it is necessary to remove all traces of organic sulphur compounds and volatile compounds of iron. In this case, the catalyst will operate continuously. A large number of industrial gases may be employed in this process, provided they contain a larger proportion of hydrogen than of carbon oxides. Any deficiency of one of the gases may be rectified by adding or removing gas, either before or after purification. The gas is first purified in the usual way, and unsaturated or aromatic hydrocarbons are removed. Carbon oxy-sulphide and other organic sulphur compounds are absorbed by active carbon, or decomposed with soda-lime, or the gas may be passed over caustic alkali. Alternatively, the gas may be mixed with steam, and passed over a catalyst such as iron oxide, to convert part of the carbon monoxide into carbon

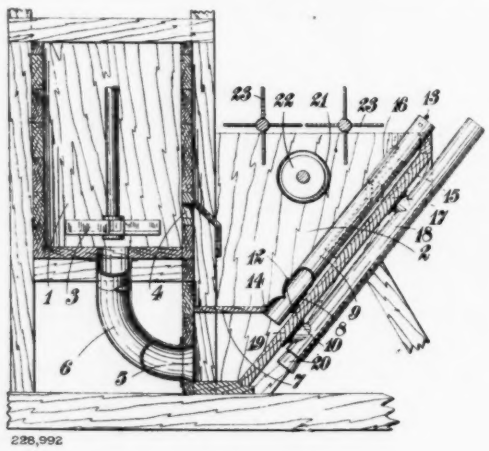
dioxide, and liberate hydrogen; the organic sulphur compounds are decomposed with formation of sulphuretted hydrogen, which can be readily removed. To remove iron carbonyl from the gas, it may be passed through a layer of active carbon, or passed over a hot mass containing metallic copper or copper compounds at a temperature below 300° C. The gas is then sufficiently pure to be used without poisoning the catalyst.

228,963. PEAT, TREATMENT OF, AND PRODUCTION OF GAS AND BY-PRODUCTS THEREFROM. K. B. E. Eller, Craycombe, Woking, Surrey. Application date, September 14, 1923.

Wet peat is disintegrated and pulped, and then delivered on to a web or travelling band which delivers it between rollers adapted to subject it to a pressure of gradually increasing intensity, so that the thickness of the layer of peat is progressively reduced and its width increased. The band and/or the rollers may be foraminous or porous to permit the expressed water to separate. To obtain a product suitable for treatment in gas producers, a proportion of drier carbonaceous material may be added to the peat after a considerable proportion of the contained water is removed.

228,992. VALVES FOR PULPY MATERIALS AND APPARATUS FOR FLOTATION CONCENTRATION. W. W. Stenning, and Minerals Separation, Ltd., 62, London Wall, London, E.C.2. Application date, November 14, 1923.

The apparatus comprises a series of agitation boxes 1 adjacent to a series of spitzkasten 2. Each agitating box has a rotating member 3 which draws pulp from a spitzkasten to the agitation box through a pipe 6 and delivers it into an adjacent box 4. Each spitzkasten is divided into two chambers by a diaphragm 7, in which is placed a regulating valve. This comprises a short open-ended metal tube 8, closely



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surrounding a tube 9 open at both ends and extending upwards above the pulp level. Each tube has a lateral opening 10, the two openings being brought into register to allow pulp to pass from the upper to the lower side of the diaphragm 7. Any clogging of the valve can be cleared by inserting a rod into the upper end of the tube 9, which projects above the liquid level. A weir 15 may be arranged in each spitzkasten at the required pulp level, so that the pulp may pass through an opening 17 and pipe 18 to the space below the diaphragm 7. The pipe 18 similarly extends upwards, so that it can be cleared if obstruction should occur. The froth is drawn off through a launder 21 with the assistance of paddles 23.

228,993. PEAT, PROCESS AND APPARATUS FOR THE TREATMENT OF. F. M. Perkin, 59, New Oxford Street, London, W.C.1, and the Bettisfield Trust Co., Ltd., 8, Queen's Street, London, E.C.4. Application date, November 14, 1923.

The raw peat is macerated and passed to a rotary vacuum filter or centrifugal separator to remove part of the water. The peat then passes to an enclosed elevator, through which a counter current of hot air or flue gas is passed to pre-heat the peat. The peat then passes to an autoclave where it is treated with superheated steam at 2–20 atmospheres pressure. The peat is then blown into a large container in which the pressure is suddenly reduced, and it is found that this breaks up the colloidal structure. The hot peat is then passed through a second rotary vacuum filter, and then to another enclosed elevator through which a cooling gas is circulated, and the gas thus heated is used to pre-heat the peat in the first elevator. The peat is then briquetted, and finally dried until it contains 20–25 per cent. of water.

228,994. CALCIUM OXALATE FROM VEGETABLE MATERIAL, RECOVERY OF. W. A. Fraymouth, and The Bhopal Produce Trust, Ltd., Bhopal, Central India. Application date, November 14, 1923.

Specification No. 227,925 (see THE CHEMICAL AGE, Vol. XII, p. 209), describes a process for the recovery of calcium oxalate from vegetable material which involves crushing the material to render the calcium oxalate more accessible. It is now found that the rate of disintegration of the raw material, *e.g.*, Terminalia Arjunia bark, may be increased five times if the moisture content is reduced to about 5 per cent. This renders the material brittle and facilitates the crushing operation.

229,021. DIATOMACEOUS EARTH, TREATMENT OF. F. W. Golby, London. From The Celite Co., 1,135, Van Nuys Building, Los Angeles, Cal., U.S.A. Application date, November 22, 1923.

This process is for improving the quality of diatomaceous earth or Kieselguhr particularly for use in the clarification and filtration of liquors such as sugar solutions. The diatomaceous earth is mixed with a small proportion, *e.g.*, about 5 per cent., of sodium chloride, and the mixture ground and heated to 1,800° F. in a muffle furnace. The product is then re-ground if necessary, and is found to be of lower density and much greater filtering efficiency than the raw material. The effect of the sodium chloride is apparently to lower the sintering point of the diatomaceous earth so that the finer particles become sintered together and prevent the clogging of the filter. The volume of the diatomaceous earth is increased about 50 per cent. by this process and the product is more porous.

229,192. ACID CALCIUM LACTATE, PROCESS FOR MANUFACTURING. J. A. von Wulfing, 231, Friedrichstrasse, Berlin, and A. Busch, 2, Blucherstrasse, Braunschweig, Germany. Application date, July 23, 1924.

In the process for making acid calcium lactate by mixing an aqueous solution of calcium lactate with the corresponding quantity of lactic acid, concentrating the solution, crystallising out the unaltered neutral calcium lactate, and evaporating the solution of the acid salt, it is necessary to wash the crystals of the acid salt to remove the adhering lactic acid. This is due to the incomplete combination by which some of the neutral salt crystallises out and leaves the corresponding quantity of excess free acid. In the present process, this disadvantage is avoided by mixing one molecular proportion of calcium lactate with two molecular proportions of lactic acid, and as little water as possible. These substances are allowed to react during drying of the mixture at a slightly raised temperature. A quantitative yield of acid calcium lactate is obtained in the form of a non hygroscopic powder.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—205,503 (Farbwerke vorm. Meister, Lucius, and Brüning) relating to manufacture of monoazo dyestuffs, see Vol. IX, p. 693; 207,174 (Siemens and Halske Akt.-Ges.) relating to electrolytic processes, see Vol. X, p. 101; 213,895 (Metal Traders, Ltd.) relating to the production of sulphuric acid, see Vol. X, p. 629; 216,083 (General Motors Research Corporation) relating to manufacture of organic lead compounds, see Vol. XI, p. 71; 221,512 (Compagnie de Bethune, Soc. Anon.) relating to production of ethyl sulphuric acid, see Vol. XI, p. 504; 224,505 (Soc. Chimique de la Grande Paroisse) relating to production of ammonium and potassium salts, see Vol. XII, p. 59.

### International Specifications not yet Accepted

227,468. ARTIFICIAL RESINS. Regal and Co., J. Novak, and J. Kostal, Brünn, Czecho-Slovakia. International Convention date, January 12, 1924.

Phenols and formaldehyde or their derivatives are condensed with the aid of ozone or ozonides, which may be mixed with their parent materials or decomposition products, as catalysts. Ozone may be passed through the mixture, *e.g.*, of cresol and formaldehyde, or sandarac ozonide or ozonised pinene may be added.

227,475. METHYL ALCOHOL AND METHYLENE CHLORIDE. T. Goldschmidt Akt.-Ges., 18, Salkenbergsweg, Essen, Germany. International Convention date, January 10, 1924.

Methane is chlorinated and the products freed from hydrochloric acid and passed into milk of lime to saponify the methyl chloride to methyl alcohol which remains in the vessel. The residual gases are cooled under pressure to separate the methylene chloride, and the remaining methane, etc., is returned to the chlorination process.

227,799. CHEMICAL FURNACES. Farbwerke vorm. Meister, Lucius, and Brüning, Hoechst-on-Main, Germany. International Convention date, January 18, 1924. Addition to 225,548 (see THE CHEMICAL AGE, Vol. XII, p. 117).

Specification 225,548 describes a salt cake furnace, and in this invention the acid is fed through pipes in the muffle roof to the hearth. The stirrer may be covered with acid-proof material.

LATEST NOTIFICATIONS

230,423. Process for the production of solidified cyanides of alkali metals. Norsk Hydro Elektrisk Kvaelstofaktieselskab. March 8, 1924.

230,432. Process for the preparation of the ureides of perhydrogenated aromatic and fatty aromatic carboxylic acids. Chemische Fabrik vorm. Sandoz. March 10, 1924.

230,447. Process for the recovery of concentrated acetic acid from dilute acetic acid. Dr. H. Suida. March 8, 1924.

230,457. Manufacture of new w-aminoalkylsubstituted aminonaphthalene sulphonic acids. Farbenfabriken vorm. F. Bayer and Co. March 4, 1924.

### Specifications Accepted with Date of Application

212,569. 4-oxynapthalene-1-arylketones, Manufacture of. Soc. of Chemical Industry in Basle. March 6, 1923. Addition to 203,824.

219,922 and 223,190. Alkyl and aralkyl resorcinols, Manufacture of. Sharp and Dohme, Inc. July 31 and October 9, 1923.

224,863. Coke oven gases and the like, Purification of. L'Air Liquide Soc. Anon pour l'Etude et l'Exploitation des Procedes G. Claude. November 17, 1923.

225,505. Coke and semi coke, Production of. Soc. Anon. des Petroles Houilles, et Derives. November 28, 1923.

229,714 Oxygenated organic compounds, Manufacture and production of. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) August 23, 1923.

229,715. Methanol, Synthetic manufacture of. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) August 23, 1923.

229,719. Anthraquinone sulphonic acids, Production of. J. Thomas and Scottish Dyes, Ltd. August 31, 1923.

229,750. Metal oxides, Production of. Wiskemann, Smith and Co., Ltd. (*J. Plantz.*) November 26, 1923.

229,768. Power gas and phosphorus, Process for producing. E. Britzke. December 1, 1923.

229,774 and 229,973. Hydrocyanic acid, Process for the production of. G. Bredig and E. Elod. December 1, 1923.

229,798. Sulphuretted hydrogen generators. J. Lewis, J. Dick, and W. C. Hope. December 17, 1923.

229,839. Alloy. H. O. Ormiston. January 30, 1924.

229,880. Low temperature carbonisation. P. C. Zuyderhoudt. March 21, 1924.

229,891. Gas producers. Regenerative Coal Gasification System, Ltd., M. W. Travers, and F. W. Clark. April 5, 1924.

229,247. Acid proof coating for metallic vessels. Felton and Guilleaume, Carlswerk Akt.-Ges. February 12, 1924.

229,946. Sodium-tri-bismuth tartrate, Process for the preparation of. C. F. Boehringer and Soehne Ges., and G. Giemsa. August 26, 1924.

229,958. Esters, Manufacture of. F. Hefti and W. Schilt. October 31, 1923.

### Applications for Patents

Aluminium Co. of America. Electrolytic production of aluminium. 6,669. March 11. (United States, April 10, 1924.)

Badische Anilin- und Soda-Fabrik, and Johnson, J. Y. Synthesis of organic compounds. 6,383. March 9.

Badische Anilin- und Soda-Fabrik. Refining hydrocarbons. 6,384. March 9.

Badische Anilin- und Soda-Fabrik. Manufacture of organic compounds. 6,755. March 12.

Badische Anilin- und Soda-Fabrik. Manufacture of formamide. 6,975. March 14.

Badische Anilin- und Soda-Fabrik. Manufacture of fertilisers. 6,976. March 14.

Benzonaftène. Catalysers, etc. 6,544. March 21. (France, March 26, 1924.)

Benzonaftène. Treatment of oils, etc. 6,545. March 10. (France, March 24, 1924.)

Benzonaftène. Installations for treatment of oils, etc. 6,546. March 10. (France, March 26, 1924.)

Benzonaftène. Installations for extraction of hydrocarbons, etc., from oils, etc. 6,547 and 6,548. March 10. (France, March 28, 1924.)

British Dyestuffs Corporation, Ltd., Jones, L. A., Perkin, W. H., and Robinson, R. Dyeing acetate silk. 6,775. March 12.

British Dyestuffs Corporation, Ltd. Vulcanisation of rubber. 6,776. March 12.

British Dyestuffs Corporation, Ltd., Burger, A. W., and Perkin, W. H. Manufacture of acridine derivatives. 6,777. March 12.

Carter, B. C. Centrifugal separators. 6,987. March 14.

Deutsche Werft Akt.-Ges. Containers for liquefied carbon dioxide. 6,541. March 10. (Germany, March 10, 1924.)

Farbwerke vorm. Meister, Lucius and Brüning, and Imray, O. Y. Manufacture of 2-amino-naphtahlene-1-carboxylic acid, etc. 6,811. March 12.

Medcalf, W. H. Treating oleaginous substances and extracting fat, etc., therefrom. 6,733. March 12.

Minerals Separation, Ltd. Concentration of ores. 6,439. March 9.

Minerals Separation, Ltd. Concentration of ores. 6,911. March 13.

Pictet, A. Manufacture of anhydrides of disaccharides. 6,989 March 14. (Switzerland, March 14, 1924.)

Schlumpf, J. Machine for dyeing vegetable, etc., fibres. 7,000. March 14.

Soc. Alsacienne de Produits Chimiques. Manufacture of borneols. 6,990. March 14. (France, March 28, 1924.)

Whale, J. Softening water. 6,930. March 14.

Worms, J. P. Dyeing processes. 6,403. March 9. (October 22, 1923.)

### New Cements and their Possibilities

A RECENT communication from the Department of Mines at Ottawa deals with a possible new use for titaniferous iron ore in connection with newly discovered cements. These new cements—called Titan cements—are quick-hardening high-strength cements, having a lime base like Portland and alumina cements but differing from them in having as their chief acid constituent titania ($TiO_2$) instead of silica or alumina. They are said to be more uniform in composition, more dense, and chemically more resistant (and hence probably more durable), than any cement heretofore produced. They are made by fusing a mixture of titaniferous iron ore, limestone and coke in either an electric furnace or a blast furnace, the products being pig iron (a by-product) and slag that when finely ground constitutes Titan cement.

Commercial success for these new cements will depend largely on ability to manufacture them at a cost not materially greater than that of the Portland and alumina cements with which they will compete. There are several points in eastern Canada where Titan cements might possibly be made at a profit, but the most striking advantages are those afforded by the Saguenay district in Quebec, where, within a radius of a few miles, are to be found large bodies of highly titaniferous magnetite, limestones, and one of the largest developments of cheap hydro-electric power in America.

### Obituary

Mr. A. C. Hopps, senior director of A. Hopps and Sons, Ltd., oil merchants and manufacturers, of George Street, Liverpool, aged 82.

Mr. R. A. Oddy, F.C.S., of Shawclough, Rochdale.

Mr. William Derry, B.A., chemical engineer, at Timperley, on March 14, aged 79.

# London Chemical Market

*The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

*London, March 20, 1925.*

THE increased activity noted in our report of last week has been maintained, although orders are still in the main for small quantities, and all the business passing is keenly competed for.

Prices on the whole continue steady, but business generally on the export side is uninteresting.

### General Chemicals

ACETONE.—Business has been better and price is much steadier at £75 to £77 per ton, ex wharf, London.

ACID ACETIC.—Trade is only moderate and the price nominally is £40 per ton for technical 80 %, with pure at £42 per ton.

ACID CITRIC.—Only in fair request, price unchanged at 1s. 5d. to 1s. 5½d. per lb.

ACID FORMIC has been more active, price unchanged for 85%, with technical quality at £51 to £52 per ton, and future outlook very firm.

ACID LACTIC.—A fair amount of business has been transacted and 50% by weight is quoted at £43 per ton, with the market firm.

ACID OXALIC continues firm, and price is unchanged at 3¾d. per lb.

ACID TARTARIC buyers are still somewhat shy, but there is a certain amount of inquiry in the field which will doubtless have its effect on the present low value very shortly.

ALUMINA SULPHATE.—Demand is only moderate, while competition is keen in the extreme, 17/18% may be taken at round about £6 12s. 6d. to £6 15s. per ton.

ARSENIC.—Business continues as slack as ever, and the nominal price is about £30 per ton, which could be shaded for real business.

BARIUM CHLORIDE continues fairly quiet, and the present value is about £11 per ton.

COPPER SULPHATE continues in fair demand, and the average value is about £24 per ton.

CREAM OF TARTAR is in good request, and is to-day quoted at £77 per ton, ex wharf.

EPSOM SALTS is unchanged.

FORMALDEHYDE seems to be in better request, and price is firm at from £43 to £44 per ton.

LEAD ACETATE maintains its active position at £46 per ton for white and £44 per ton for brown.

LEAD NITRATE is unchanged at £44 per ton.

LIME ACETATE is unchanged, with little business passing.

METHYL ALCOHOL is in better request, and price is firm at £50 per ton, ex wharf.

POTASSIUM PRUSSIATE is very firm and in short supply at 8d. per lb.

SODIUM ACETATE is quiet, and the present value is only £21 per ton, ex store.

SODIUM HYPOSULPHITE is unchanged at British makers' figures.

SODIUM PRUSSIATE is in moderate demand, and price is unchanged at 4½d. per lb.

SODIUM SULPHIDE is unchanged.

### Coal Tar Products

There is no great change in the market position from last week.

90% BENZOL is steady at 1s. 8½d. per gallon on rails.

PURE BENZOL is quoted at 1s. 11d. to 2s. per gallon, on rails.

CREOSOTE OIL is steady at 6½d. per gallon, on rails in the north, while the price in London is 7¼d. to 7¾d. per gallon.

CRESYLIC ACID is plentiful, with no great demand. The pale quality 97/99% is quoted at 1s. 9d. per gallon, on rails, in bulk, while the Dark quality 95/97% is valued at about 1s. 7d. to 1s. 8d. per gallon, on rails.

SOLVENT NAPHTHA is steady at 1s. 4d. per gallon, on rails.

HEAVY NAPHTHA is quoted at 1s. 1d. to 1s. 2d. per gallon, on rails.

NAPHTHALENES are in poor demand, the lower qualities being worth from £4 to £4 10s. per ton, while the higher quality 76/78° is quoted at £6 to £6 10s. per ton, and 74/76° quality is valued at £5 10s. to £6 per ton.

PITCH is dull; prices, however, remain unchanged. To-day's approximate values are 42s. 6d. to 45s., f.o.b. London; 40s. to 42s. 6d. per ton, f.o.b. East and West coast ports.

## Nitrogen Products Market

EXPORT.—During the past week the export demand has continued unabated, especially from the Continent, and producers have disposed of available quantities at about £13 10s. per ton f.o.b. It is expected that the Continental consumption will absorb the balance available between now and the end of May. More distant markets appear to be fully booked for prompt delivery.

HOME.—The home demand is now beginning to be strong. The early part of the season was distinctly disappointing, but this was entirely due to the water-logged condition of a large part of the country. It is anticipated that the season will be a late one and that large home deliveries will be made right up to the end of May. The home price for delivery to May will remain unchanged at £14 14s. per ton for neutral quality, basis 21·1 per cent. nitrogen, delivered in sellers' single bags to consumers nearest station, tare allowed. The ordinary quality has been sold out in the West Wales and Yorkshire districts and very little of this remains anywherenow.

NITRATE OF SODA.—The nitrate of soda market continues weak and cargoes can be purchased at £11 15s. per ton c.i.f. The Continental consumption has not been up to estimates, and the holders are disposing at low figures. The American price has been affected adversely by the diversion of shipments originally intended for Europe.

## American Market Movements

(From *Drug and Chemical Markets.*)

DEMAND for heavy chemicals still nominal. Caustic soda moving in very large volume on contracts. Other prices steady with market generally quiet. Benzene advanced 1 c. gal. by leading distributors. Other light oil distillates continue strong and scarce. Intermediates continue quiet with prices generally maintained.

Oils show reviving activity, with linseed up, tallow firmer, and increased inquiry in menhaden oil. Chinawood still easy with other vegetable oils steadier. Animal oils firmer at unchanged figures and fish oils more active.

Fine chemicals have shown considerable strength. Mercury is firmer. Potash permanganate active. Menthol lower. Strychnine in keen competition. Essential oil average for February is higher.

## German Chemical Market

(FROM A CORRESPONDENT.)

BUSINESS has almost come to a complete standstill, apart from a few chemicals, which are still in demand. Caustic potash went down in price and lots of ten tons could be had at $13.50. Caustic soda in drums of 56 kilos was sold at £16. Chlorate of potash was on the market in small quantities at $11.50. The price for chloride of calcium was firmer, as works are no longer inclined to accept every offer made. Lots of 15 tons were quoted at £3 7s. 6d. Demand for tartaric acid continues to be lively and customers are getting used to prices made on the basis of work quotations. Transactions were carried out at $49.30. The price of glycerin, which of late had not even reached the level of the raw product, has somewhat recovered. Offers were on market at $35, which is in no way proportional to raw material. Oxalic acid was traded packed in small lots at £25. Nitrite of soda is still in high demand and almost all orders could be placed and lots offered at £21 could easily be sold. The price for chloride of barium remains unchanged. Prompt available goods were still in demand. Quotations for naphthaline remain the same. Market price for this product in balls or flakes was £13 12s. 6d. Permanganate of potash was quoted at about £48 10s. There was a rise in Epsom salts; lots from 50 to 100 tons could not be had under £2 18s. Pharmaceutical products were traded at £5 sterling. Magnesium chloride is still in demand and only large quantities are to be had at £3.

# Weekly Prices of British Chemical Products

*The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at retailers' works.*

## General Heavy Chemicals

Acid Acetic, 40% Tech.—£21 to £23 per ton.
Acid Boric, Commercial.—Crystal, £45 per ton, Powder, £47 per ton.
Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.
Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.
Acid Sulphuric.—Average National prices f.o r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.
Bleaching Powder.—Spot, £10 10s. d/d.; Contract, £10 d/d. 4 ton lots.
Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.
Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
Calcium Chloride (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.
Copper Sulphate.—£25 to £25 10s. per ton.
Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.
Nickel Sulphate.—£38 per ton d/d. Normal business.
Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.
Potash Caustic.—£30 to £33 per ton.
Potassium Bichromate.—5d. per lb.
Potassium Chlorate.—2½d. to 3d. per lb.
Salammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.
Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.
Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 20s. less for contracts.
Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.
Sodium Acetate 97/98%.—£24 per ton.
Sodium Bicarbonate.—£10 10s. per ton, carr. paid.
Sodium Bichromate.—4d. per lb.
Sodium Bisulphite Powder 60/62%.—£16 to £17 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.
Sodium Chlorate.—2¾d. per lb.
Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.
Sodium Nitrite 100% basis.—£27 per ton d/d.
Sodium Sulphate (Glauber Salts).—£3 12s. 6d. per ton.
Sodium Sulphide conc. solid. 60/65.—About £15 per ton d/d. Contract £14 15s. Carr. pd.
Sodium Sulphide Crystals.—£9 5s. per ton d/d. Contract £9 2s. 6d. Carr. pd.
Sodium Sulphide, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

## Coal Tar Products

Acid Carbolic Crystals.—5d. per lb. Quiet demand. Crude 60's, 1s. 5d. to 1s. 7d. per gall. Little demand.
Acid Cresylic 97/99.—1s. 8d. to 2s. per gall. Rather more inquiry. Pale, 95%, 1s. 7d. to 1s. 10d. per gall. Dark, 1s. 7d. to 1s. 9d. per gall.
Anthracene Paste 40%.—4d. per unit per cwt.—Nominal price. No business.
Anthracene Oil, Strained.—7d. to 8d. per gall. Unstrained, 6d. to 7d. per gall.
Benzol.—Crude 65's.—9d. to 11½d. per gall., ex works in tank wagons. Standard Motor, 1s. 4½d. to 1s. 6d. per gall., ex works in tank wagons. Pure, 1s. 9½d. to 1s. 11d. per gall., ex works in tank wagons. Supplies very scarce.
Toluol,—90%, 1s. 7d. to 1s. 7½d. per gall. More inquiry. Pure, 1s. 11d. to 2s. per gall. Steady demand.
Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.
Creosote.—Cresylic, 20/24%, 8½d. to 9d. per gall. Better demand. Middle Oil, Heavy, Standard specification, 6d. to 7d. per gall., according to quality and district. Steady demand.
Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 3d. to 1s. 7d. per gall. Demand good. Solvent 90/190, 1s. 4d. to 1s. 6d. per gall. Demand good. Market very firm.
Naphthalene Crude.—Demand rather better. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £3 to £5 per ton. Demand rather better. Whizzed or hot pressed, £6 to £9 per ton.
Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to districts.
Pitch.—Medium soft, 40s. to 45s. per ton, according to district. Not much business.
Pyridine.—90/160, 17s. 6d. to 18s. per gall. Market easier. Fair demand. Heavy, 11s. to 12s.

## Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Business in dyestuffs has not improved since last week and prices are not steady.

Acetic Anhydride 95%.—1s. 7d. per lb.
Acid H.—3s. 9d. per lb. 100% basis d/d.
Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.
Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.
Acid Salicylic, technical.—11½d. to 1s. per lb. Price reduced. Improved demand.
Acid Sulphanilic.—9d. per lb. 100% basis d/d.
Aluminium Chloride, anhydrous.—10d. per lb. d/d.
Aniline Oil.—8d. per lb. naked at works.
Aniline Salts.—8d. per lb. naked at works.
Antimony Pentachloride.—1s. per lb. d/d.
Benzidine Base.—3s. 8d. per lb. 100% basis d/d.
Benzyl Chloride 95%.—1s. 1d. per lb.
*p*-Chlorphenol.—4s. 3d. per lb. d/d.
*p*-Chloraniline.—3s. per lb. 100% basis.
*o*-Cresol 29/31° C.—3d. per lb. Demand quiet.
*m*-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
*p*-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
Dichloraniline.—2s. 3d. per lb.
Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.
*p*-Dichlorbenzol.—£85 per ton.
Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.
Dimethylaniline.—2s. 2d. per lb. d/d. Drums extra.
Dinitrobenzene.—9d. per lb. naked at works.
Dinitrochlorbenzol.—£84 10s. per ton d/d.
Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. 2d. per lb. naked at works.
Diphenylaniline.—2s. 10d. per lb. d/d.
G. Salt.—2s. 2d. per lb. 100% basis d/d.
Monochlorbenzol.—£63 per ton.
*a*-Naphthol.—2s. 3d. per lb. d/d.
*B*-Naphthol.—1s. per lb. d/d.
*a*-Naphthylamine.—1s. 3½d. per lb. d/d.
*B*-Naphthylamine.—3s. 9d. per lb. d/d.
*m*-Nitraniline.—4s. 2d. per lb. d/d.
*p*-Nitraniline.—2s. 2d. per lb. d/d.
Nitrobenzene.—5½d. to 5¾d. per lb. naked at works.
*o*-Nitrochlorbenzol.—2s. 3d. per lb. 100% basis d/d.
Nitronapthalene.—10d. per lb. d/d.
*p*-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.
*p*-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.
*m*-Phenylene Diamine.—4s. per lb. d/d.
*p*-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.
R. Salt.—2s. 4d. per lb. 100% basis d/d.
Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.
*o*-Toluidine.—10d. per lb.
*p*-Toluidine.—2s. 4d. per lb. naked at works.
*m*-Toluylene Diamine.—4s. per lb. d/d.

## Wood Distillation Products

Market depressed. Short hours in Lancashire cotton trade are a handicap to business in acetates.

Acetate of Lime.—Brown £11. Quiet market. Grey, £15 10s. per ton. Firmer. Liquor, 9d. per gall. 32° Tw.
Acetone.—£78 per ton.
Charcoal.—£7 5s. to £9 per ton, according to grade and locality. Fair demand.
Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.
Red Liquor.—10d. to 1s. per gall. 14/15° Tw.
Wood Creosote.—2s. 9d. per gall. Unrefined.
Wood Naphtha, Miscible.—4s. 9d. per gall. Only moderate market. 60% O.P. Solvent, 5s. per gall. 40% O.P.
Wood Tar.—£4 to £5 per ton. Demand slack and stocks being held.
Brown Sugar of Lead.—£43 10s. per ton.

## Rubber Chemicals

Antimony Sulphide.—Golden, 7¼d. to 1s. 5d. per lb., according to quality. Crimson, 1s. 5d. to 1s. 7½d. per lb., according to quality.
Arsenic Sulphide, Yellow.—2s. per lb.
Cadmium Sulphide.—4s. 4d. per lb., according to quantity.
Carbon Bisulphide.—£32 to £35 per ton, according to quantity.
Carbon Black.—6d. to 6½d. per lb., ex wharf.
Carbon Tetrachloride.—£62 to £67 per ton, according to quantity, drums extra.
Chromium Oxide, Green.—1s. 4d. per lb.
Indiarubber Substitutes, White and Dark.—5¼d. to 7¼d. per lb.
Lamp Black.—£48 per ton, barrels free.
Lead Hyposulphite.—9d. per lb.
Lithopone, 30%.—£22 10s. per ton.

**Mineral Rubber** "Rubpron."—£16 to £18 per ton f.o.r. London.
**Sulphur.**—£10 to £12 per ton, according to quality.
**Sulphur Chloride.**—4d. per lb., carboys extra.
**Sulphur Precip. B.P.**—£56 to £65 per ton.
**Thiocarbanilide.**—2s. 6d. per lb.
**Vermilion, Pale or Deep.**—5s 6d. per lb. Dearer.
**Zinc Sulphide.**—1s. 1d. per lb.

## Pharmaceutical and Photographic Chemicals

**Acid, Acetic 80% B.P.**—£43 to £45 per ton ex wharf London in glass containers.
**Acid, Acetyl Salicylic.**—2s. 10d. to 3s. 11d. per lb., according to quantity. Market slightly easier.
**Acid, Benzoic B.P.**—2s. to 2s. 6d. per lb., according to quantity.
**Acid, Boric B.P.**—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
**Acid, Camphoric.**—19s. to 21s. per lb.
**Acid, Citric.**—1s. 4½d. per lb., less 5% for ton lots. Slightly upward tendency.
**Acid, Gallic.**—2s. 9d. per lb. for pure crystal, in cwt. lots. Easier.
**Acid, Pyrogallic, Crystals.**—6s. per lb. for 1 cwt. lots. 7s. 6d. per lb. for 7-lb. lots according to quantity. Steady market.
**Acid, Salicylic.**—1s. 5d. to 1s. 6d. per lb., according to quantity. Steady market.
**Acid, Tannic B.P.**—2s. 9d. per lb. Quiet steady demand.
**Acid, Tartaric.**—1s. 1d. per lb., less 5%. Very firm. Demand good.
**Amidol.**—9s. per lb., d/d.
**Acetanilide.**—1s. 9d. per lb. Price lower owing to competition.
**Amidopyrin.**—14s. per lb. Ample supplies.
**Ammonium Benzoate.**—3s. to 3s. 6d. per lb., according to quantity.
**Ammonium Carbonate B.P.**—£37 per ton. Powder, £39 per ton in 5 cwt. casks.
**Atropine Sulphate.**—12s. 6d. per oz. for English make.
**Barbitone.**—12s. 6d. per lb. Cheaper. Market less firm for Potash and Soda Salts.
**Benzonaphthol.**—4s. 3d. per lb. spot. Weaker. Demand quiet.
**Bismuth Salts.**—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
**Bismuth Carbonate.**—10s. 6d. to 12s. 6d. per lb.
**Bismuth Citrate.**—10s. 3d. to 12s. 3d. per lb.
**Bismuth Salicylate.**—9s. to 11s. per lb.
**Bismuth Subnitrate.**—8s. 8d. to 10s. 8d. per lb. according to quantity.
The price of Bismuth Metal has been raised from 5s. to 7s. 6d. per lb. Bismuth Salts have been advanced accordingly.
**Borax B.P.**—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
**Bromides.**—Potassium, 1s. 6d. per lb.; sodium, 1s. 7d. per lb.; ammonium, 1s. 11d. per lb. Slight upward tendency.
**Calcium Lactate.**—1s. 7d. to 1s. 9d., according to quantity. Fair demand and steady market.
**Chloral Hydrate.**—3s. 10d. per lb., duty paid.
**Chloroform.**—2s. 6d. per lb. for cwt. lots.
**Creosote Carbonate.**—6s. 9d. per lb. Little demand.
**Formaldehyde.**—£42 10s. per ton, in barrels ex wharf London.
**Glycerophosphates.**—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
**Guaiacol Carbonate.**—7s. 10d. to 8s. per lb.
**Hexamine.**—2s. 9d. to 2s. 10d. per lb. For bold crystal. Powder slightly less.
**Homatropine Hydrobromide.**—25s. to 30s. per oz.
**Hydrastine Hydrochloride.**—English make offered at 120s per oz.
Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon for makers' works, naked.
**Hydroquinone.**—4s. 3d. per lb. Nominal.
**Hypophosphites.**—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
**Iron Ammonium Citrate B.P.**—1s. 11d. to 2s. 3d. per lb.
**Magnesium Carbonate.**—Light Commercial, £36 per ton net. Light pure, £46 per ton.
**Magnesium Oxide.**—Light Commercial, £72 10s. per ton, less 2½%, price reduced; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.
**Menthol.**—A.B.R. recrystallised B.P., 44s. 6d. per lb.; March delivery. Synthetic 26s. to 35s. per lb., according to quality.
**Mercurials.**—Market very quiet. Mercury slightly firmer. Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb.
**Methyl Salicylate.**—1s. 7d. to 1s. 11d. per lb., according to quantity.
**Methyl Sulphonal.**—20s. per lb. Cheaper.
**Metol.**—11s. per lb. British make.
**Morphine and Salts.**—Reduced by 1s. to 1s. 3d. per oz.
**Paraformaldehyde.**—2s. 2d. for B.P. quality. Keen competition has brought prices down.
**Paraldehyde.**—1s. 2d. to 1s. 6d. per lb., in free bottles and cases.
**Phenacetin.**—5s. per lb. in cwt. lots. Unsettled. Supplies exceed demand.
**Phenazone.**—6s. 3d. to 6s. 6d. per lb. Spot price lower than forward.
Phenolphthalein.—4s. 6d. to 5s. per lb. for cwt. lots.
**Potassium Bitartrate 99/100% (Cream of Tartar).**—83s. per cwt., less 2½% for ton lots.
**Potassium Citrate.**—1s. 10d. to 2s. 2d. per lb.
**Potassium Ferricyanide.**—1s. 9d. per lb. Quiet.
**Potassium Iodide.**—16s. 8d. to 17s. 5d. per lb., according to quantity. Steady market.
**Potassium Metabisulphite.**—7½d. per lb., 1-cwt. kegs included. f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., spot; commercial, 8d. to 8½d. per lb., carriage paid. Slight reaction after recent advance.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—4s. 9d. per lb. In fair quantities. Supplies exceed demand.
Saccharin.—63s. per lb. in 50-lb. lots.
Salol.—3s. 6d. per lb., for cwt. lots. Slightly dearer.
Silver Proteinate.—12s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb. From natural benzoic acid. Supplies of good quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb.
Sodium Potassium Tartrate (Rochelle Salt).—75s. per cwt., for ton lots and upwards.
Sodium Salicylate. Powder, 2s. 2d. to 2s. 3d. per lb. Crystal, 2s. 3d. to 2s. 5d. per lb. Flake, 2s. 6d. per lb. Strong demand, market firmer.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity; 1 cwt. kegs included.
Sulphonal.—13s. 6d. per lb. accepted for qantity.
Thymol.—18s. per lb. Firmer.

## Perfumery Chemicals

Acetophenone.—11s. per lb.
Aubepine.—11s. 3d. per lb. Cheaper.
Amyl Acetate.—3s. per lb.
Amyl Butyrate.—6s. 6d. per lb.
Amyl Salicylate.—3s. 3d. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 7½d. per lb. Cheaper.
Benzyl Alcohol free from Chlorine.—2s. 7½d. per lb. Cheaper.
Benzaldehyde free from Chlorine.—3s. 1½d. per lb.
Benzyl Benzoate.—3s. 1½d. per lb. Cheaper.
Cinnamic Aldehyde Natural.—16s. per lb. Cheaper.
Coumarin.—16s. 6d. per lb.
Citronellol.—22s. per lb.
Citral.—10s. per lb.
Ethyl Cinnamate.—10s. per lb. Cheaper.
Ethyl Phthalate.—3s. per lb.
Eugenol.—10s. 6d. per lb.
Geraniol (Palmarosa).—28s. 6d. per lb. Cheaper.
Geraniol.—12s. 6d. to 20s. per lb.
Heliotropine.—6s. 3d. per lb. Cheaper.
Iso Eugenol.—15s. per lb. Cheaper.
Linalol ex Bois de Rose.—24s. 6d. per lb. Cheaper.
Linalyl Acetate.—24s. 6d. per lb. Cheaper.
Methyl Anthranilate.—10s. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—50s. per lb.
Musk Ketone.—37s. 6d. per lb.
Musk Xylol.—11s. per lb.
Nerolin.—4s. 6d. per lb.
Phenyl Ethyl Acetate.—15s. per lb. Cheaper.
Phenyl Ethyl Alcohol.—14s. per lb.
Rhodinol.—37s. 6d. per lb.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. per lb. Cheaper.
Vanillin.—25s. to 25s. 6d. per lb.

## Essential Oils

Almond Oil, Foreign S.P.A.—13s. 9d. per lb.
Anise Oil.—2s. 6d. per lb.
Bergamot Oil.—16s. per lb.
Bourbon Geranium Oil.—22s. 6d. per lb. Cheaper.
Camphor Oil.—65s. per cwt.
Cananga Oil, Java.—11s. per lb.
Cinnamon Oil, Leaf.—6d. per oz.
Cassia Oil, 80/85%.—9s. per lb.
Citronella Oil.—Java, 85/90%, 5s. 6d. per lb. Ceylon, 3s. 2d. to 3s. 5d. per lb., according to quality.
Clove Oil.—7s. 9d. per lb.
Eucalyptus Oil, 70/75%.—2s. 1d. per lb.
Lavender Oil.—French 38/40% Esters, 35s. per lb.
Lemon Oil.—3s. 2d. per lb.
Lemongrass Oil.—5s. 9d. per lb.
Orange Oil, Sweet.—10s. 9d. per lb.
Palma Rose Oil.—16s. per lb.

# Scottish Chemical Market

***The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.***

*Glasgow, March* 19, 1925.

THE heavy chemical market has shown slightly more activity during the past week, but the volume of business still leaves much to be desired. One or two changes in prices are notable, oxalic acid and carbonate of potash both being slightly dearer, while Cornish arsenic is still lower by almost £2 per ton.

### Industrial Chemicals

ACID ACETIC.—Quoted prices unchanged. 98/100% glacial, £56 to £67 per ton, according to quality and packing; 80% pure about £42 to £44 per ton; 80% technical, £41 to £43 per ton, packed in casks delivered c.i.f. U.K. ports, duty free. Some slightly cheaper parcels of technical quality 80% are offered from the continent at round about £40 per ton, but only limited quantities available.

ACID BORACIC.—Remains unchanged. Crystal or granulated, £45 per ton; powdered, £47 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—In moderate request and price unchanged at about 5¼d. per lb. delivered. Offered for forward delivery at a fraction less.

ACID CITRIC, B.P. CRYSTALS.—Offered for early delivery at 1s. 4⅜d. per lb., less 5% ex wharf. Spot material quoted 1s. 4½d. per lb. less 5% ex store.

ACID FORMIC, 85%.—Offered from the continent at £49 per ton, ex wharf.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Spot material now quoted 4d. per lb., ex store. Offered from the continent at 3⅞d. per lb., ex wharf.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Offered for early delivery at 11¾d. per lb., less 5% ex store. Spot quotations a fraction higher, but reasonably large parcels could probably be placed at this figure.

ALUMINA SULPHATE, 17/18%, IRON FREE.—Spot lots unchanged at about £7 5s. per ton, ex store. Offered from the continent for prompt shipment at about £6 12s. 6d. per ton, c.i.f. U.K. port.

ALUM.—Lump potash alum offered from the continent at about £8 7s. 6d. per ton c.i.f. U.K. ports. Spot lots still available at about £9 10s. per ton, ex store.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb., ex station. Containers extra and returnable, with possible slight reduction for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered U.K. port.

AMMONIA LIQUID, 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantities, containers extra.

AMMONIA MURIATE.—Grey galvanizers' crystals of English manufacture unchanged at about £30 per ton, ex store, packed in casks. Bags, £1 per ton less. Offered from the continent at about £25 15s. per ton, c.i.f. U.K. port. Fine white crystals quoted £21 2s. 6d. per ton, c.i.f. U.K. ports, prompt shipment from the continent.

ARSENIC, WHITE POWDERED.—Still lower. Spot material obtainable at about £33 per ton, ex store. Offered for early delivery at about £29 per ton, ex wharf. Foreign arsenic quoted £25 per ton, c.i.f. U.K. port.

BARIUM CARBONATE, 98/100%.—Offered from the continent at about £8 5s. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE, 98/100%.—English material slightly cheaper at about £10 15s. per ton, ex store. Offered from the continent at about £9 10s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots quoted £10 10s. per ton, ex station; contracts, 20s. per ton less.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. port.

BORAX.—Unchanged. Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, ex station. Continental on offer at £3 17s. 6d. per ton c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton, ex works, packed in casks, free.

COPPER SULPHATE.—British materials quoted £24 10s. per ton f.o.b. U.K. port. Continental available at about £24 per ton, ex store. Offered from the continent at about £23 to £24 per ton according to packages, c.i.f. U.K. port.

FORMALDEHYDE, 40%.—Quotation remains unchanged at about £44 10s. per ton, ex store, but spot parcels could probably be obtained for less. Offered for prompt shipment from the continent at about £40 per ton, c.i.f. U.K. port.

GLAUBER SALTS.—White crystals of English manufacture quoted £4 per ton, ex store or station. Continental on offer at about £3 10s. per ton, c.i.f. U.K. port.

LEAD, RED.—Imported material unchanged at about £44 10s. per ton, ex store.

LEAD, WHITE.—On offer at £46 per ton, ex store.

LEAD, ACETATE.—Refined white crystals quoted £46 per ton, c.i.f. U.K. ports, prompt shipment from the continent. Spot lots on offer at about £47 per ton, ex store. Dark brown quality quoted £39 10s. per ton, c.i.f. U.K. ports.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton, ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station. Finer quality of continental manufacture quoted £7 15s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Continental quotations unchanged at about £3 15s. per ton, c.i.f. U.K. ports.

POTASH CAUSTIC 88/92%.—Unchanged at about £29 per ton, ex wharf, prompt shipment from the continent. Spot material available at about £30 10s. per ton, ex store.

POTASSIUM BICHROMATE.—Price for home consumption, 5d. per lb. delivered.

POTASSIUM CARBONATE 96/98%.—Continental manufacturers advise slight advance in price, now quoted £24 10s. per ton, c.i.f. U.K. port. Spot material still available at about £25 5s. per ton, ex store.

POTASSIUM CHLORATE.—Offered from the continent at 3d. per lb., c.i.f. U.K. ports. Spot lots quoted 3¼d. per lb., ex store.

POTASSIUM NITRATE, SALTPETRE.—Refined granulated 99% at about £25 per ton c.i.f. U.K. port, prompt shipment from the continent. Spot material available at about £28 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot material quoted 8¼d. per lb., ex store, in little demand.

POTASSIUM PRUSSIATE, YELLOW.—In good demand, and price unchanged at about 7¾d. per lb., ex store, spot delivery.

SODA CAUSTIC.—76/77%, £18 per ton; 70/72%, £16 12s. 6d. per ton; broken, 60%, £17 2s. 6d. per ton; powdered, 98/99%, £21 7s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts, 20s. per ton less.

SODIUM ACETATE.—Quoted £22 per ton, ex store, but could probably be obtained for less. Offered for early delivery at about £20 per ton, ex wharf.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station; M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Price for home consumption, 4d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material quoted, £9 15s. per ton, ex station. Continental about £9 5s. per ton, ex store. Offered for forward delivery at about £8 5s. per ton, c.i.f. U.K. port. Pea crystals of English manufacture quoted £14 per ton, ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 17s. 6d. per ton, ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE 100%.—Spot material on offer at about £25 per ton, ex store. Offered from the continent at about £23 5s. per ton, c.i.f. U.K. port.

SODIUM PRUSSIATE, YELLOW.—In moderate demand and price unchanged at 4½d. per lb., ex store.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton f.o.b. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English manufacturers quote: 60/62% solid, £15 per ton; broken, £1 per ton more; flake, £2 per ton more. Crystals, 31/34%, £9 5s. per ton, carriage paid U.K. stations. Minimum 4 ton lots with slight reduction for contracts over a period. Continental material slightly cheaper. 60/62% solid offered at about £11 per ton, c.i.f. U.K. port. Broken, £12 per ton, c.i.f. U.K. port. 30/32% crystals, £8 5s. per ton, c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton, ex store. Prices nominal. American crude sulphur on offer at about £5 2s. 6d. per ton, c.i.f. U.K. port.

ZINC CHLORIDE.—96/98% of continental manufacture quoted £23 per ton, c.i.f. U.K. port. English material for export on offer at about £25 to £26 per ton, f.o.b. U.K. port.

ZINC SULPHATE.—Spot material now on offer at about £12 5s. per ton, ex store, but little demand.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

**Coal Tar Intermediates and Wood Distillation Products**

J. ACID.—Fair home inquiries. Price 9s. per lb.

ALPHA NAPHTHOL.—Some home inquiries. Price 2s. 2d. per lb.

DIETHYLANILINE.—Good home inquiries. Price 3s. 7½d. per lb.

DIPHENYLAMINE.—Fair home inquiries. Price 3s. 6d. per lb.

PARANITRANILINE.—Home and export inquiries. Price 2s. 2½d. per lb.

BETA NAPHTHOL.—Good home inquiries. Price 1s. per lb.

BENZALDEHYDE.—Good export inquiries. Price 3s. 2d. per lb., packages extra.

BENZIDINE BASE.—Good export inquiries. Price 3s. 8d. per lb., per 100%.

# The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

*Manchester, March* 19, 1925.

EXCEPT in a few instances the demand for heavy chemicals this week has shown little or no improvement since last report, and both home and export business is still of a restricted character. As I pointed out last week a revival in the domestic demand for chemical products is directly dependent upon a recovery in the principal chemical-consuming industries. Overseas inquiries are reported, but the actual volume of export trade is only of moderate extent. On the Manchester Stock Exchange the reports of the United Alkali Co. and the Salt Union have led to a renewal of interest in chemical shares.

**Heavy Chemicals**

There is not much movement in sodium sulphide, although quotations keep fairly steady; 60-65 per cent. concentrated solid is offering at about £13 15s. per ton and crystals at £9 10s. Acetate of soda is rather quiet at £20 10s. per ton. Saltcake and Glauber salts are selling in comparatively small quantities; prices are £3 10s. and £3 15s. to £4 per ton respectively. Caustic soda is in fair demand and values are firm at from £15 12s. 6d. per ton for 60 per cent. material to £18 for 76-77 per cent. strength. Hyposulphite of soda is attracting only a limited amount of interest, but prices show little or no change from last week; photographic crystals are quoted at £13 10s. to £13 15s. per ton and commercial quality at about £9 10s. Bicarbonate of soda is steady, but only in moderate demand at £10 10s. per ton. Chlorate of soda is quiet, with values maintained at the recent level of 2¾d. per lb. Prussiate of soda is on offer at about 4d. per lb., but comparatively little business is being done. Alkali meets with a fairly active demand and quotations are fully maintained at £6 15s. per ton. Phosphate of soda is quiet, but unchanged at £12 10s. to £13 per ton. The demand for bleaching powder is on a small scale; quotations, however, are still on the basis of £9 10s. per ton. Soda crystals are steady and in moderate request at £5 5s. per ton. Bichromate of soda is still quoted at 4d. per lb., but the demand is not particularly good.

Caustic potash is steady though in limited inquiry at about £30 per ton. Carbonate of potash is firm at £24 to £24 10s. per ton and a fair amount of activity is being shown. Permanganate of potash is rather quiet at from 6¾d. to 7¾d. per lb., according to quality. Prussiate of potash is dull and values have an easy tendency; to-day's quotation is 7½d. to 7½d. per lb. Chlorate of potash is fairly steady at 2¾d. per lb., but the demand is limited. Bichromate of potash is maintained at round 5d. per lb.

Sulphate of copper is steady at about £24 15s. per ton and a fair export demand is being met with. Arsenic keeps very quiet and easy, current value now being about £32 per ton in Manchester for white powdered, Cornish makes. Commercial Epsom salts are only in moderate inquiry at £4 10s. to £4 15s. per ton, with magnesium sulphate, pharmaceutical quality, offering at about £6 5s. Acetate of lime is rather quiet, but values are about unchanged at £16 10s. per ton for grey and £10 10s. for brown material. White acetate of lead meets with a moderate inquiry at £46 10s. to £47 per ton and brown at £42. Nitrate of lead is in fair demand at £41 to £42 per ton.

**Acids and Tar Products**

Tartaric acid is quiet and easier at round 1s. per lb. Citric acid meets with a quietly steady demand and prices are about the same as last week at 1s. 4½d. per lb. Oxalic acid is a shade steadier than it has been for some considerable time and 3¾d. per lb. is now currently quoted. Acetic acid is not attracting very much attention; 80 per cent. commercial is on offer at £40 per ton and glacial at £67 to £68.

Business in most lines of coal-tar products is of very small volume. Carbolic crystals are weak at 5¼d. per lb. and crude at about 1s. 7d. per gallon. Pitch is very dull at 40s. to 42s. 6d. per ton. Solvent naphtha is about unchanged from last report at about 1s. 5½d. per gallon, but the demand is poor. Creosote oil is fairly steady at 6¾d. per gallon. Naphthalenes are quiet and easy at £15 per ton for refined and £4 15s. and upwards for crude qualities.

## Petroleum Technologists: Annual Meeting

AT the annual general meeting of the Institution of Petroleum Technologists, held in the rooms of the Royal Society of Arts, London, on Tuesday, March 10, Mr. Herbert Barringer, the retiring President, gave a brief general survey of the uses of petroleum and discussed the use of petroleum for power purposes. He dealt first with oil as a fuel in place of coal, and having outlined the principal mechanical and other features of the three systems of using oil as a steam generator, Mr. Barringer passed to the Diesel engine, the history of which he traced from the beginning. Discussing the relative advantages of oil and coal for steam raising purposes on ocean-going vessels, attention was drawn to the important influence played by the voyage which the vessel makes. Mr. Barringer said that it would be difficult, on certain voyages, for a motor ship to compete with steam at the present time, but for other voyages the motor vessel would prove the best. In the event of the prices of coal and oil more nearly approaching each other, the motor vessel would still further improve its position.

From the consideration of the Diesel engine, using heavy oil, Mr. Barringer passed to the petrol type of engine, the difference in characteristics of this, contrasted with the Diesel engine, being explained. Dealing with the subject of detonation, he said that experimental work had shown that by adding small percentages of iodine, aniline, di-ethyl compounds, tetra-ethyl compounds help to suppress detonation, whilst, on the other hand, the addition of bromine, oxygen, or ethyl nitrate helped to induce detonation. There were, however, certain difficulties in the use of lead tetra-ethyl. Three c.c. to one American gallon of gasolene was the proportion required, yet even the application of this small qualtity had a harmful effect on sparking plug points, causing them to disappear. To overcome this, ethylene di-bromide had been used.

In conclusion Mr. Barringer said that he would like to see the Institution able to encourage research work, a great deal more of which was required.

At the close Sir Thomas Holland, F.R.S., the new President, was inducted into the chair.

**Council Changes**

As a result of the private meeting which preceded this paper, the following changes have been made on the Council:—New members, Professor A. W. Nash, Mr. E. Lawson-Lomax; re-elected, Messrs. T. Dewhurst and W. Sutton; retiring members, Dr. Mollwo Perkin and Mr. H. Allen.

## M.P.'s and Low Temperature Carbonisation

A PARTY of members of Parliament who represent mining constituencies visited the works of the British Oil and Fuel Conservation, Ltd., at Willesden, recently, and witnessed a demonstration of low temperature carbonisation. They were shown plans which foreshadowed an important development of the enterprise. These new plans were for two retorts, each with eight chambers capable of carbonising 100 tons a day, and a briquetting press.

The Members of Parliament who are closely interested in low temperature carbonisation intend to bring the subject before the notice of the Government at the earliest opportunity, as they are convinced that the subject is one of far-reaching importance, not only to the mining industry but to the country in general. It is more than likely that a meeting of the mining members of the House of Commons will be held shortly to consider the whole subject, and to hear an address on the matter by one of the officials of the British Oil and Fuel Conservation, Ltd.

# Company News

UTAH COPPER CO.—A dividend of $1 has been declared, payable on March 31.

ROPP TIN CO.—The directors have declared a final dividend of 20 per cent., actual, for 1924.

DEUTSCHE JURGENSWERKE.—This German subsidiary company of Jurgens announces a dividend of 6 per cent. on both classes of shares.

BRITISH PORTLAND CEMENT MANUFACTURERS, LTD.—A final dividend of 5 per cent. is recommended on the ordinary shares, making 10 per cent. for the past year.

PARKES CHEMISTS.—A final dividend is announced on the preference shares for the half-year ended February 28 last, at a rate of 6 per cent. per annum, less tax, payable on March 20.

CEREBOS, LTD.—The net profits for the year ended November 30 were £75,230, and £38,700 was brought forward. A dividend of 10 per cent. and a bonus of 5 per cent., free of tax, are proposed, adding to the reserve £30,000 and to the pension fund £10,000, and carrying forward £28,930.

ENGLISH MARGARINE WORKS, LTD.—The directors announce that the net profits for the year 1924 amount to £54,865, plus £15,341 brought in. After placing £20,000 to reserve for depreciation, and payment of a dividend on the preference shares for the nine months ended December 31, 1922, the sum of £17,415 remains to be carried forward.

DOMINION TAR AND CHEMICAL CO., LTD.—The annual meeting will be held at Salisbury House, London Wall, London, on March 24, at 12 noon. Subject to the approval of the shareholders, the directors propose to pay a final dividend on the ordinary shares of 5 per cent., free of tax, making a total distribution for the year of 10 per cent., free of tax. The transfer books of the ordinary shares will be closed from March 24 to 30, both days inclusive.

BELL'S UNITED ASBESTOS CO., LTD.—The directors have resolved to recommend to the shareholders at the annual general meeting to be held on April 2, 1925, the payment of a balance dividend of 1s. 6d. per share on the ordinary shares of the company, which, with the interim dividend paid in October last, makes a total distribution of 10 per cent. for the year; that £10,000 be placed to reserve, increasing that fund to £193,446; and that £34,844 be carried forward.

SALT UNION, LTD.—For the year ended December 31 last the net profit amounts to £305,646, which, after adding the balance of £33,659 brought forward, and deducting the debenture interest, leaves an available balance of £296,509. This it is proposed to appropriate as follows:—Dividend of 2s. 4d. per share on preference shares, £70,000; dividend of 2s. 6d. per share on ordinary shares, £100,000; general reserve account, £50,000; staff superannuation fund, £10,000; balance carried forward, £66,509. The report states that the directors have been able to recommend an increase of the dividend by 2½ per cent., largely owing to the fact that the company is no longer liable for corporation profits tax.

UNITED TURKEY RED, LTD.—Presiding at the annual meeting on March 11, Mr. Henry W. Christie said that, generally speaking, competition had increased in all markets, though Japanese and Italian competition, being better organised, had been the more acutely felt. It was incumbent on every branch of the textile trade to do everything possible to hasten the return of real economic production, and so far as the company was concerned the directors are seeking in every way to reduce costs. In some directions, however, their efforts were disappointing, on one hand because dyes were still being sold in competitive markets far below the rates ruling in this country, and this was placing the company at a distinct disadvantage at the outset; on the other hand, taxation in this country was very heavy compared with that of competitive countries, and was handicapping manufacturers.

UNITED ALKALI CO., LTD.—The annual report of the directors to be submitted at the general meeting of shareholders on March 25 states that the certified balance sheet and profit and loss account showed a net profit, after the transfer of £15,000 to debenture redemption fund account, of £457,812, to which was added a balance brought forward from 1923 of £102,846, making a total of £560,658. The directors have transferred to the reserve account (bringing the total to £1,000,000) £150,000, leaving an unappropriated balance of £410,658. They propose to apportion the balance as follows: Interim dividend on preference shares, 7 per cent. per annum, £98,883; interim dividend on ordinary shares, 5 per cent., £45,000; final dividend on preference shares at 7 per cent. per annum, £98,883, and final dividend on ordinary shares at 7½ per cent. (making 12½ per cent. for the year), £67,500, carrying forward to 1925 £100,392.

## New Chemical Trade Marks

### Applications for Registration

*This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.*

*Opposition to the Registration of the following Trade Marks can be lodged up to April 18, 1925.*

"BOYCEITE."

445,695. For a chemical substance to be added to motor spirit, for the purpose of improving combustion and increasing efficiency. Boyce and Veeder Co., Inc. (a company organised under the laws of the State of New York, United States of America), 316, Queens Boulevard, Long Island City, New York, United States of America, manufacturers. February 25, 1924.

"LEEROPAAN."

455,077. For a mordant for leather. Naamlooze Vennootschap "Organon" Tot Bereiding van Orgaanpreparaten Op Weten Schappelijken Grondslag (a corporation organised according to the laws of the Netherlands), Oss, Holland, manufacturers. January 6, 1924.

"COLANITE."

452,778. For chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. Norman Campbell Bickerdike, 27, Creechurch Lane, London, E.C.3, manufacturer and merchant. October 16, 1924.

"EGALON."

455,376. For chemical substances used in manufactures, photography or philosophical research, and anti-corrotives. Chemische Fabriken Vorm. Weiler-ter-Meer (a joint stock company organised under the laws of Germany), Rheinuferstrasse, Uerdingen, Niederrhein, Germany, manufacturers. January 15, 1924.

## Chemical Trade Inquiries

*The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.*

OILS AND FATS, ETC.—A firm of agents at Nantes, wishes representation of British firms for sale in Nantes and West of France of comestible oils, oils and fats, sugars, glucose. (Reference No. 328.)

FUEL OIL.—The State Electricity Supply Works at Montevideo are calling for tenders for the supply of fuel oil. (Reference No. B.X. 1661.)

## Tariff Changes

AUSTRIA.—A special licence is now required for the importation and exportation of calcium carbide, glues, matches, molasses, rice starch, magnesite, crude and calcined, artificial silk, crude potash salts (manurial salts, waste salts), raw beet potash, tartar, crude, sulphate of ammonia, fusel oil (crude), fertilisers, etc., ammunition.

ICELAND.—A decree forbidding the import of candles, soap, soap flakes and powder, has been repealed.

ROUMANIA.—The following duties have been fixed—explosives, 1,000 lei per kilog; nitric acid, 1,000 lei per kilog. These goods are exempt from commission tax.

FRANCE.—It is proposed to levy a tax, payable by the importer or producer, on coal and coke.

# Commercial Intelligence

*The following are taken from printed reports, but we cannot be responsible for any errors that may occur.*

## County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry make no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

BISSELL, S. S. J., Vale Place, Merridale Street, Wolverhampton, chemists' manufacturer. (C.C., 21/3/25.) £15 5s. 8d. November 18.

LEONARDS MANUFACTURING CHEMISTS, LTD., 144, Albany Street, N.W. (C.C., 21/3/25.) £20 10s. 10d. February 16.

## Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

CLARK (ROBERT INGHAM) AND CO. (SCOTLAND), LTD., London, S.W., paint manufacturers. (M., 21/3/25.) Registered March 4 (by order on terms), £2,500 charge, to Mrs. M. Wilson or Dowie, Broomley, Bridge of Weir; charged on property at Renfrew.

JUDGE BRAND CO., LTD., Gateshead, chemists. (M., 21/3/25.) Registered March 10. £2,500 debentures; general charge. *£5,000. May 26, 1924.

MAGADI SODA CO., LTD., London, E.C. (M., 21/3/25.) Registered March 9, £500,000 debentures and premium of 5 per cent. (secured by Trust Deed dated March 3, 1925, present issue £499,950); general charge (exclusive of uncalled capital).

SOUTHDOWN CHEMICAL CO., LTD., Birkenhead. (M., 21/3/25.) Registered March 6, £10,000 debentures; general charge. *£2,000. October 31, 1924.

SPEDOL MANUFACTURING CO., LTD., Brentford, paint manufacturers. (M., 21/3/25.) Registered March 4, £1,600 second debenture part of £5,000; general charge. *£8,050. November 27, 1924.

THIEL ROGERS AND CO., LTD., London, E.C., druggists' sundriesmen. (M., 21/3/25.) Registered March 6, £1,200 debentures (filed under section 93 (3) of the Companies (Consolidation) Act 1908), present issue £850; general charge.

### Satisfaction

ALLEN AND HANBURYS, LTD., London, E.C., chemists. (M.S., 21/3/25.) Satisfaction registered March 10, £80,000, registered September 22, 1920.

## New Companies Registered

BAMAG-MEGUIN (GREAT BRITAIN), LTD., 100, Victoria Street, London, S.W.1. To construct plants for the carbonisation, distillation, gasification or otherwise of carbonaceous materials, coal, coke, peat, wood, oilshale, oil and by-products, etc. Nom. cap., £30,000 in £1 shares.

BINDERS INTERNATIONAL CO., LTD.—To manufacture and deal in agglomerates for sands, fireproof materials, metal waste and fuel capable of being utilised or recuperated in foundries or metallurgical establishments. Nom. cap., £1,000 in £1 shares. Solicitor: E. Desquesnes, 9, Bexley Square, Salford.

HIGHWAYS COLLOIDAL, LTD., 70, Victoria Street, London, S.W. Chemists, manufacturers and mixers of colloidal solutions; druggists, drysalters, oil and colourmen, etc. Nom. cap., £10,000 in £1 shares.

JACK KING, LTD. Coal, Coke, anthracite or breeze merchants; manufacturers of coke and chemical products; lime burners, smelters, etc. Nom. cap., £10,000 in £1 shares. Solicitors: Harold Mayhew and Co., 47, Temple Row, Birmingham.

GEORGE RHODES AND SONS, LTD., 169, Sunbridge Road, Bradford. Dealers in wool products of all kinds; manufacturers of and dealers in chemicals of all descriptions, soap, dyes and dyeing materials, etc. Nom. cap., £10,000 in £1 shares.

### Research Chemist's Affairs

THE Receiving Order in the matter of George Crace Calvert (the elder), "Elmhurst," Twickenham Park, Middlesex, scientist, was made recently on debtor's own petition. The statement of affairs showed liabilities, £4,029, and assets, £5,016. Of the assets, £5,000 represented patents. Debtor attributed his position to insufficient income and loss in connection with arbitration proceedings. It appeared that a previous Receiving Order was made against him in January, 1903, and he had not obtained his discharge from those proceedings. Since then he had been engaged in chemical research work, inventing and developing certain processes used in chemical and other trades. He had patented a number of inventions, some of which have been sold, and others were subject to an option to purchase. In 1921, disputes arose under three option agreements, and arbitration proceedings followed. The Arbitrator gave an award partly adverse to him in one case, and the proceedings in the other two cases were at a standstill. Under legal advice he applied to the High Court to have the award varied, but did not succeed. In connection with these proceedings he incurred considerable expense. He became aware of his position early in November, 1924.

### America's Chemical Exports

OFFICIAL figures show that exports of chemicals and allied products in the United States during January attained an average value of $12,620,000, a 12 per cent. increase on last year's figures, and an increase over any other single month throughout 1924, with the exception of October.

Exports of industrial chemicals continued to record a slight decline, the total for the month of January having equalled $2,090,000. In the fertiliser group, total exports amounted to 65,990 tons, and ammonium sulphate reflected the greatest change with foreign shipments showing a decline on last year of 40 per cent. The values of the entire group of coal-tar chemicals fell from $1,283,000 in January, 1924, to $917,000 in January, 1925. Foreign sales of colours, dyes and stains amounted to 2,007,000 pounds, valued at $658,000. The most striking change in the import trade in chemicals and allied products occurred in the fertiliser group, which showed a marked diminution—24 per cent. in quantity and 35 per cent. in value.

### Alleged Improper Use of Letter

MR. JUSTICE ROMER, in the Chancery Division, on Friday, again had mentioned to him the motion by the British Oxygen Co., Ltd., for an injunction restraining Liquid Air, Ltd., from dealing with a private business letter written by one of plaintiffs' managers to a customer. Counsel had agreed to ask his lordship to take the motion on March 25. Mr. Upjohn said there was urgency about it. The defendants obtained a copy of this letter and made photographs of it which they showed to their customers, and, what was more important, they also showed it to jobbers and others on the Stock Exchange for the purpose of affecting prices.

His lordship said he would hear the motion on March 25.

### Analytical Chemist's Affairs

EDWARD ERNEST MUNRO PAYNE, analytical chemist, of Narborough, Leicestershire, has filed his petition, with liabilities of £1,343 and assets £1 19s. 7d. The Official Receiver said debtor had been employed by a firm of tanners since 1905 at a salary of £10 per week and commission, which amounted to £146 in 1921, £363 in 1922, £247 in 1923, and £126 last year. The liabilities included £459 arrears of income tax and £426 amount overdrawn from employers. Debtor stated that his failure was due to the diminution in his income during the last four years in consequence of difficulty of doing export trade.